United States Department of Agriculture

Soil Conservation Service

In cooperation with the United States Department of Agriculture, Forest Service, and the Missouri Agricultural Experiment Station

Soil Survey of Barry County, Missouri

How To Use This Soil Survey

General Soil Map

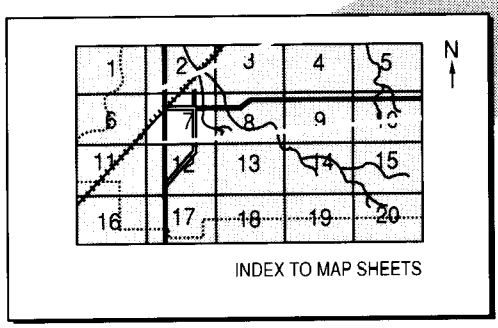
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

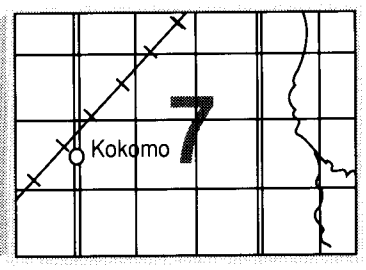
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

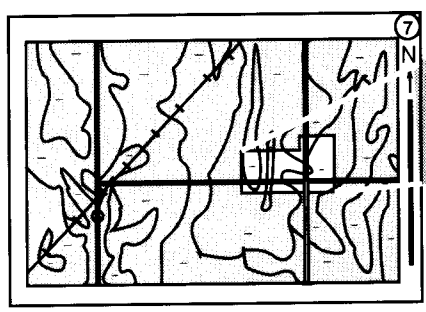


INDEX TO MAP SHEETS



MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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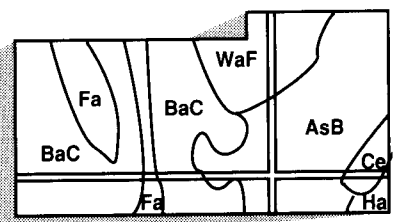

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1990. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Soil Conservation Service; the United States Department of Agriculture, Forest Service; and the Missouri Agricultural Experiment Station. The Missouri Department of Natural Resources provided a soil scientist to assist with the fieldwork. The Barry County Commission and private individuals through the Barry County Soil and Water Conservation District also provided funds for a soil scientist to assist with the fieldwork. The survey is part of the technical assistance furnished to the Barry County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Typical landscape in an area of the Mano-Moko-Rock outcrop association.

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Issued July 1994

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Summary of Tables

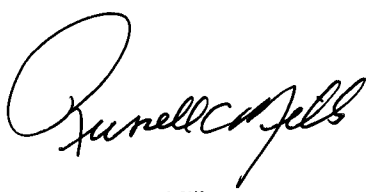
Foreword

This soil survey contains information that can be used in land-planning programs in Barry County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service, the Forest Service, or the Cooperative Extension Service.



Russell C. Mills
State Conservationist
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Soil Survey of Barry County, Missouri

By Max W. Aldrich, Soil Conservation Service, and Dennis Meinert, Missouri Department of Natural Resources

Fieldwork by Max W. Aldrich, Soil Conservation Service, Dennis Meinert, Missouri Department of Natural Resources, and Ron McMurtrey, Barry County Soil and Water Conservation District and Barry County Commission

United States Department of Agriculture, Soil Conservation Service, in cooperation with the United States Department of Agriculture, Forest Service, and the Missouri Agricultural Experiment Station

BARRY COUNTY is in southwest Missouri (fig. 1). The northwestern part of the county is in the Ozark Border major land resource area, and the southeastern part is in the Ozark Highland major land resource area. The county is bordered on the north by Lawrence County, on the west by Newton and McDonald Counties, on the east by Stone County, and on the south by the state of Arkansas. In 1980, the county had a population of 24,408. Cassville, the county seat, had a population of 2,091. Monett, located on the Barry-Lawrence County line, had a population of 4,367. It is the largest town in Barry County. The county has a total area of 505,901 acres, or about 790 square miles, including 10,945 acres of water. The areas of water consist of Table Rock Lake and its major tributaries.

Agriculture is the main enterprise in Barry County. The main crops are grasses for pasture and hay and some tall fescue seed. Other agricultural enterprises include beef cattle and dairy cattle operations. The poultry industry is rapidly becoming one of the major enterprises in the county. The east-central and southeastern parts of the county are extensively forested. They include about 50,000 acres in the Mark Twain National Forest, which is administered by the Cassville Ranger District.

This survey updates the soil survey of Barry County published in 1918 *(7)*. It provides more detailed soils maps using aerial photographs and additional interpretive information.

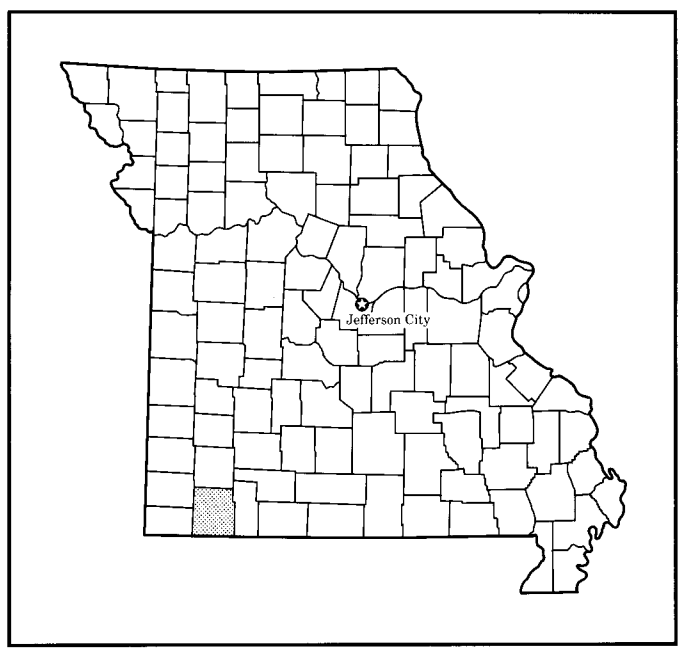

Figure 1.—Location of Barry County in Missouri.

In 1918, Curtis Fletcher Marbut, a native of Barry County, was in charge of the Soil Survey Division of the United States Department of Agriculture, Bureau of Soils. He was known worldwide as an expert on soil

classification and is considered by many to be the father of soil science in the United States.

General Nature of the County

This section gives general information about the county. It describes geology and physiography, drainage and relief, and climate.

Geology and Physiography

Dennis Meinert, soil scientist, Missouri Department of Natural Resources, helped prepare this section.

Barry County is on the Springfield Plateau and the Salem Plateau. It is predominantly on the Springfield Plateau, but the southeastern and east-central parts of the county and a small area in the southwestern part are on the Salem Plateau. The majority of the county is underlain by sedimentary rock of Ordovician or Lower Mississippian age. The soils in these areas formed in residuum or in loess and material weathered from sedimentary rock *(3, 5)*. The remaining areas in the county consist of a band of Devonian-age shale along the McDonald County line and in the south-central part of the county; an area in the southwestern part underlain by upper Mississippian-age limestone, sandstone, and shale and capped by Pennsylvanian-age sandstone; and isolated outcrops of Pennsylvanian-age sandstone in the northern third of the county.

The soils and topography in Barry County are influenced to a great extent by many different geologic formations. From the oldest to the youngest, these formations are the Jefferson City-Cotter, Chattanooga, Compton, Pierson, Elsey-Reed Springs, Burlington-Keokuk, Hindsville, Batesville, Fayetteville, and Hale. Two major fault lines also affect the topography and soils in the county. The Greasy Creek Fault extends up Greasy Creek from the southwest corner of the county to just northeast of the small community of McDowell. The Eagle Rock Fault extends from the Arkansas State line, through central Barry County, to just northeast of the junction of State Highway 37 and State Highway 39. These faults have resulted in the raising or lowering of adjoining geologic units. As a result, the soil patterns in these areas differ from normal soil patterns.

The Jefferson City Formation and the Cotter Formation are of Ordovician age. Because they are difficult to differentiate, they are often combined into one unit and called the Jefferson City-Cotter Formation. The Jefferson City-Cotter Formation underlies the southeastern and east-central parts of the county and a small portion of the southwestern part. It consists of thin or medium bedded, tan dolomite that has thin layers of chert, sandstone, and shale. It weathers into a clay that is dominated by smectitic clays. The soils in areas of this formation vary widely because of differences in pedogenic processes and in the chemical and physical patterns of weathering. Mano, Ocie, Blueye, and Moko soils are examples of soils in areas of the formation. Exposed bedrock is common throughout these areas.

The Chattanooga Formation overlies the Jefferson City-Cotter Formation in the south-central and southwestern parts of the county. It consists of a Devonian-age black shale about 10 feet thick. It has limited extent in the county. It breaks down quickly and generally is overlain by Snead soils.

The Compton Formation borders the Chattanooga Formation and is underlain by the Jefferson City-Cotter Formation. It consists of light gray limestone that ranges from 10 to 25 feet in thickness. It outcrops on the rugged hillslopes and nose slopes of southwestern, southeastern, and east-central Barry County. The amount of outcrops varies. The largest amount is in the southwestern and southeastern parts of the county, and the smallest amount is in the northern sections of the east-central part. The outcrops occur as small bluffs that form a stairstep pattern on the hillslopes and on level or nearly level glades on the nose slopes. They otherwise have very little effect on the soils or topography of the county.

The Pierson Formation is thin, pale red to brown limestone that overlies the Compton Formation in some areas of southern Barry County. It has little effect on the soils.

The Reed Springs Formation and the Elsey Formation have lithologic similarities. They are combined into one unit and called the Reed Springs-Elsey Formation. The Reed Springs-Elsey Formation consists of thin, alternating layers of limestone and chert. The layers of chert usually are in the form of nodules or wavy beds of chert between thin layers of limestone. These beds of chert make up about 60 to 70 percent of the formation. Because the content of chert is high, the soils in these areas formed in residuum, are dominated by fragments and stones of chert, and do not have clay in the subsoil. Examples are the Hailey and Nixa soils. The combined thickness of the Reed Springs Formation and the Elsey Formation ranges from approximately 100 feet in the northeastern part of the county to about 200 feet in the southern part.

The Burlington Formation and the Keokuk Formation are geologically similar in southwest Missouri. They are considered as a single unit. The Burlington-Keokuk Formation is light gray limestone that ranges from 100 to 150 feet in thickness. It has discontinuous bands of chert and isolated nodules of chert. The soils that formed in the material weathered from this formation are characterized by this chert and by a dark red clay

that is dominated by kaolinite. They include Clarksville, Noark, and Scholten soils. In the northern and central parts of Barry County, the residuum is overlain by loess or silty sediments. Tonti and Captina soils are dominant in these areas.

The other formations in the county are the Hindsville Formation, the Batesville Formation, the Fayetteville Formation, and the Hale Formation. These formations occur in a thinly bedded sequence or in close proximity to each other in the southwestern part of the county. The Hindsville Formation consists of limestone, the Batesville Formation of sandstone, the Fayetteville Formation of shale, and the Hale Formation of sandstone. The combined thickness of the formations in the gently rolling areas ranges from 25 to 100 feet. The combined thickness on the monadnocks is as much as 180 feet. The soils vary according to the parent material and thickness of the formations. Beemont, Yelton, and Lily soils developed in these formations.

The Burlington-Keokuk Formation, the Elsey-Reed Springs Formation, and the Jefferson City-Cotter Formation have a major effect on soil conditions and a minor effect on topographic development in Barry County.

Drainage and Relief

Barry County is near the southwestern part of the divide that separates the Missouri River system from the White River system. The headwaters of several streams are located in the county—Shoal Creek in the northwestern part of the county, Sugar Creek in the southwestern part, Clear Creek in the north-central part, and Crane Creek in the northeastern part. Flat Creek, in the south-central part, flows north and almost reaches the county line before flowing southeast and exiting the county near the center of the eastern side. The White River system that drains the southeastern part of the county has been dammed and now forms Table Rock Lake.

The northwestern part of the county is rolling and has gradual slopes. A plateau that is more than 1,500 feet in elevation extends from Washburn to just south of Purdy and from Pleasant Ridge to south of Madry. The plateau is rounded and is deeply dissected on the southeast aspect. It has a steep slope of 60 percent or more. It extends to Table Rock Lake, which has a normal pool of 915 feet above sea level.

Climate

Barry County is hot in summer and moderately cool in winter. Rainfall is fairly heavy and is well distributed throughout the year. Snow falls nearly every winter, but snow cover usually lasts only a few days.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Cassville, Missouri, in the period 1951 to 1986. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 35 degrees F and the average daily minimum temperature is 21 degrees. The lowest temperature on record, which occurred at Cassville on January 19, 1984, is -19 degrees. In summer, the average temperature is 75 degrees and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred on July 31, 1980, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 43 inches. Of this, more than 25 inches, or about 60 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 5.41 inches at Cassville on May 15, 1956. Thunderstorms occur on about 57 days each year.

The average seasonal snowfall is about 10 inches. The greatest snow depth at any one time during the period of record was 14 inches. On the average, 3 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south-southeast. Average windspeed is highest, 13 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of

crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar)

inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are named and mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The description, names, and delineations of the soils identified on the general soil map of this county do not fully agree with those in the surveys of adjacent counties published at a different date. Differences may be the result of additional soil data, variations in the intensity of mapping, or correlation decisions that reflect local conditions.

Soil Descriptions

Dominantly Nearly Level to Moderately Steep Soils in the Ozark Border Area

These soils are in the north and west-central sections of the county. They make up about 38.8 percent of the county. The associations in this group differ in kinds of soil and in topography.

Most of these soils are used for general farming. The area typically is used for pasture and is interspersed with woodland, row crops, small grain crops, and hay. Seed for tall fescue is the main cash crop in this area. Erosion is the main management concern. A low available water capacity is a limitation.

1. Secesh-Claiborne Association

Very deep, nearly level to gently sloping, well drained, silty soils that have a high content of gravel in the lower part; on stream terraces and foot slopes

This association is on stream terraces and toe slopes along the flood plains of medium and large streams. Areas are long and narrow. They generally are less than one-half mile wide and dissect other associations.

This association makes up about 6 percent of the county. It is about 58 percent Secesh soils, 18 percent Claiborne and similar soils, and 24 percent minor soils (fig. 2).

The Secesh soils are nearly level and very gently sloping and are on low stream terraces. Typically, the surface layer is very dark grayish brown, very friable silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is dark brown and very dark grayish brown, very friable silt loam in the upper part; dark brown, friable silty clay loam in the next part; and strong brown and reddish brown, friable very gravelly silty clay loam in the lower part.

The Claiborne soils are gently sloping and are on stream terraces and toe slopes. Typically, the surface layer is dark brown, very friable silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches. In sequence downward it is dark brown, friable silt loam; reddish brown and yellowish red, friable gravelly silt loam; yellowish red, friable gravelly silty clay loam; and yellowish red and red, friable very gravelly silty clay loam.

The minor soils in this association are those in the Elk, Cedargap, Dunning, Huntington, Racoon, and Waben series. Cedargap, Dunning, and Huntington soils have a surface layer that is thicker and darker than that of the major soils. They are on flood plains. Elk soils have a light colored surface layer and are on high flood plains. Waben soils are gravelly throughout and are on stream terraces and alluvial fans along small drainageways. Racoon soils are poorly drained and are on flood plains.

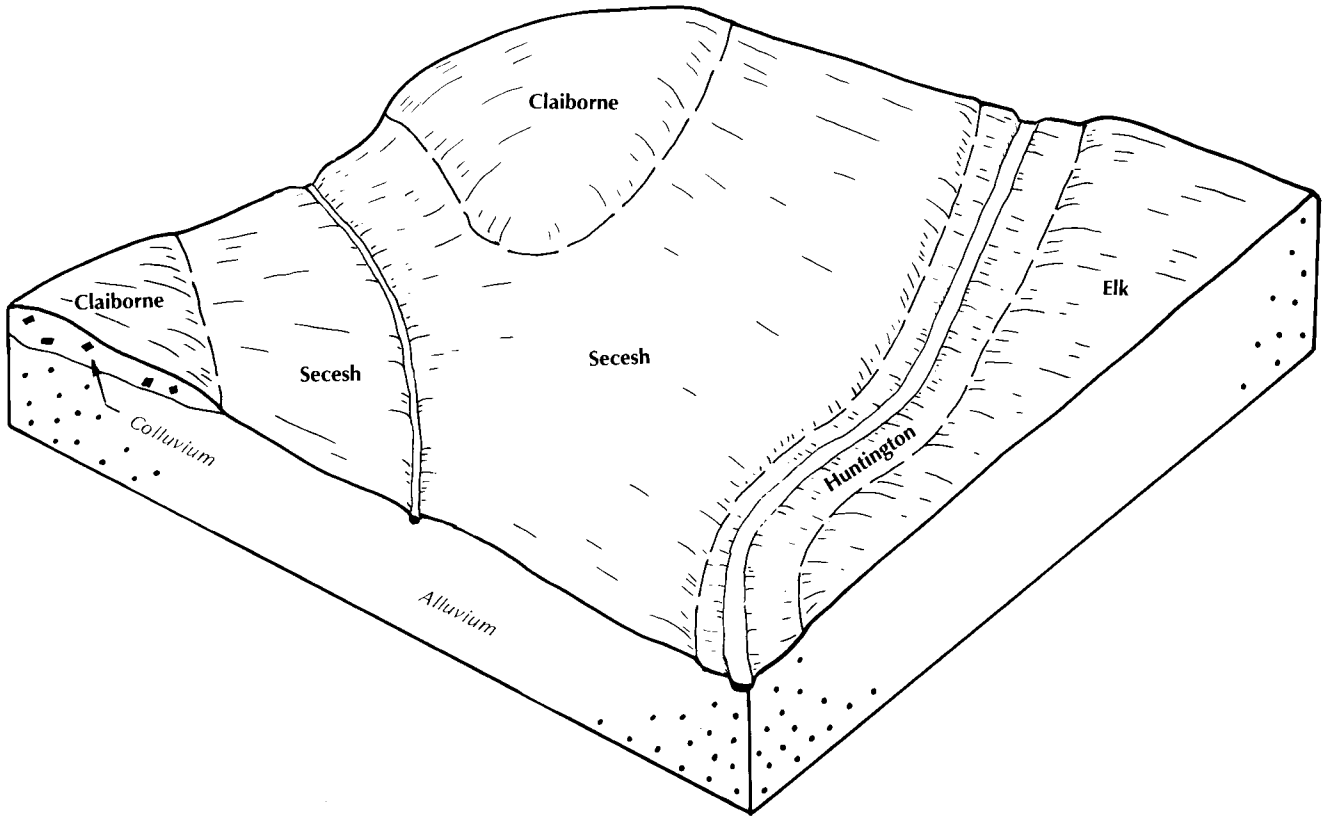

Figure 2.—Pattern of soils and parent material in the Secesh-Claiborne association.

About 70 percent of this association is used for pasture and hay, 25 percent for cultivated crops, and 5 percent as woodland. These soils are suited to small grain, soybeans, grain sorghum, and grasses and legumes. Flooding and deterioration of tilth are the main management concerns in areas used for cultivated crops, pasture, or hay.

These soils are well suited to trees. No major management concerns affect planting or harvesting.

These soils are suited to building site development and onsite waste disposal systems if the soils are protected from the flooding.

2. Branson-Pembroke Association

Very deep, very gently sloping, well drained, silty soils; on uplands

This association is in a basin at the headwaters of Flat Creek. The area is rectangular and is about 2 miles wide and 4 miles long.

This association makes up about 1 percent of the county. It is about 64 percent Branson soils, 17 percent Pembroke soils, and 19 percent minor soils.

Typically, the surface layer of the Branson soils is very dark grayish brown, very friable silt loam about 4 inches thick. The subsurface layer is dark brown, very friable silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown, friable silty clay loam in the upper part; red, dark red, and brown, firm silty clay in the next part; and dark red, mottled, firm silty clay and clay in the lower part.

Typically, the surface layer of the Pembroke soils is dark brown, very friable silt loam about 10 inches thick. The subsurface layer is dark brown and very dark grayish brown, very friable silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is brown and reddish brown, friable silt loam in the upper part; reddish brown and red, friable silty clay loam in the next part; and dark reddish brown, friable silty clay in the lower part. In eroded areas the surface layer is brown or reddish brown silty clay loam.

The minor soils in this association are those in the Barden, Carytown, and Parsons series. Barden soils are moderately well drained. Carytown soils are poorly drained. Parsons soils are somewhat poorly drained. The minor soils are in landscape positions similar to

those of the Branson and Pembroke soils.

About 75 percent of this association is used for cultivated crops. The remainder is used for pasture and hay. These soils are well suited to small grain, soybeans, sorghum, nursery plants, and grasses and legumes. Erosion is the major management concern.

These soils are well suited to trees. No major management concerns affect planting or harvesting.

These soils are suited to building site development and some onsite waste disposal systems. The shrink-swell potential is a limitation affecting the construction of dwellings. Seepage is a limitation affecting sewage lagoons.

3. Hoberg-Creldon-Keeno Association

Very deep, very gently sloping to moderately sloping, moderately well drained, silty and very gravelly, silty soils; on uplands and high stream terraces

This association is on broad ridgetops and side slopes on uplands and stream terraces. These soils have a fragipan.

This association makes up about 1 percent of the county. It is about 69 percent Hoberg soils, 20 percent Creldon soils, and 11 percent Keeno soils.

The Hoberg soils are gently sloping. Typically, the surface layer is very dark grayish brown, very friable silt loam about 8 inches thick. The upper part of the subsoil is about 16 inches thick. It is strong brown, friable silty clay loam and dark brown, mottled, friable gravelly silty clay loam. The next part is a fragipan of mottled, firm and brittle, extremely gravelly silty clay loam about 24 inches thick. The lower part to a depth of 60 inches or more is red and reddish brown, mottled, very firm extremely gravelly silty clay.

The Creldon soils are very gently sloping. Typically, the surface layer is very dark grayish brown, very friable silt loam about 10 inches thick. The upper part of the subsoil is about 17 inches thick. It is dark brown, friable silty clay loam and dark brown and yellowish brown, firm silty clay. The next part is a fragipan of mottled, firm and brittle, very gravelly silty clay loam about 23 inches thick. The lower part to a depth of 60 inches is dark red, firm very gravelly clay.

The Keeno soils are gently sloping and moderately sloping. Typically, the surface layer is very dark grayish brown, very friable very gravelly silt loam about 10 inches thick. The upper part of the subsoil is about 13 inches thick. It is dark brown, friable very gravelly silty clay loam and strong brown and dark yellowish brown, friable extremely gravelly silty clay loam. The next part is a fragipan of mottled, firm and brittle, extremely gravelly silty clay loam about 8 inches thick. The lower part to a depth of 60 inches or more is dark red, firm very gravelly clay and clay.

About 50 percent of this association is used for pasture and hay. The remainder is used for cultivated crops. These soils are suited to small grain, soybeans, grain sorghum, and grasses and legumes. The hazard of erosion, the gravel fragments in the surface layer, a restricted rooting depth, a seasonal high water table, and a low available water capacity are the main management concerns.

These soils are suited to building site development and some onsite waste disposal systems. The seasonal wetness and restricted permeability are limitations affecting septic tank absorption fields. The wetness is a limitation on sites for dwellings and sewage lagoons.

4. Scholten-Tonti Association

Very deep, very gently sloping to moderately sloping, moderately well drained, silty and gravelly, silty soils that have a fragipan; on uplands

This association is on broad ridgetops and side slopes in the uplands. It is dissected by small drainageways.

This association makes up about 30 percent of the county. It is about 49 percent Scholten soils, 35 percent Tonti soils, and 16 percent minor soils (fig. 3).

The Scholten soils are moderately sloping and are on ridgetops and side slopes in the uplands. Typically, the surface layer is dark grayish brown and dark brown, very friable gravelly silt loam about 6 inches thick. The subsurface layer is light yellowish brown, very friable gravelly silt loam about 3 inches thick. The upper part of the subsoil is yellowish brown, friable very gravelly silty clay loam about 15 inches thick. The next part is a fragipan of mottled, very firm and brittle, very gravelly silt loam about 9 inches thick. The lower part to a depth of 60 inches or more is dark red, mottled, firm gravelly clay.

The Tonti soils are very gently sloping to gently sloping and are on the broad ridges in the uplands. Typically, the surface layer is brown, very friable silt loam about 8 inches thick. The subsoil above the fragipan is about 18 inches thick. It is yellowish brown and strong brown, friable silty clay loam in the upper part and brown and yellowish brown, mottled, firm gravelly silty clay loam in the lower part. Below this to a depth of 60 inches or more is a fragipan of mottled, firm and brittle, very gravelly silty clay loam.

The minor soils in this association are those in the Captina, Cedargap, Creldon, Hoberg, Keeno, Needleye, Noark, Secesh, Waben, and Yelton series. Captina, Creldon, Hoberg, Needleye, and Yelton soils are in landscape positions similar to those of the Tonti soils. Captina and Needleye soils have less than 15 percent

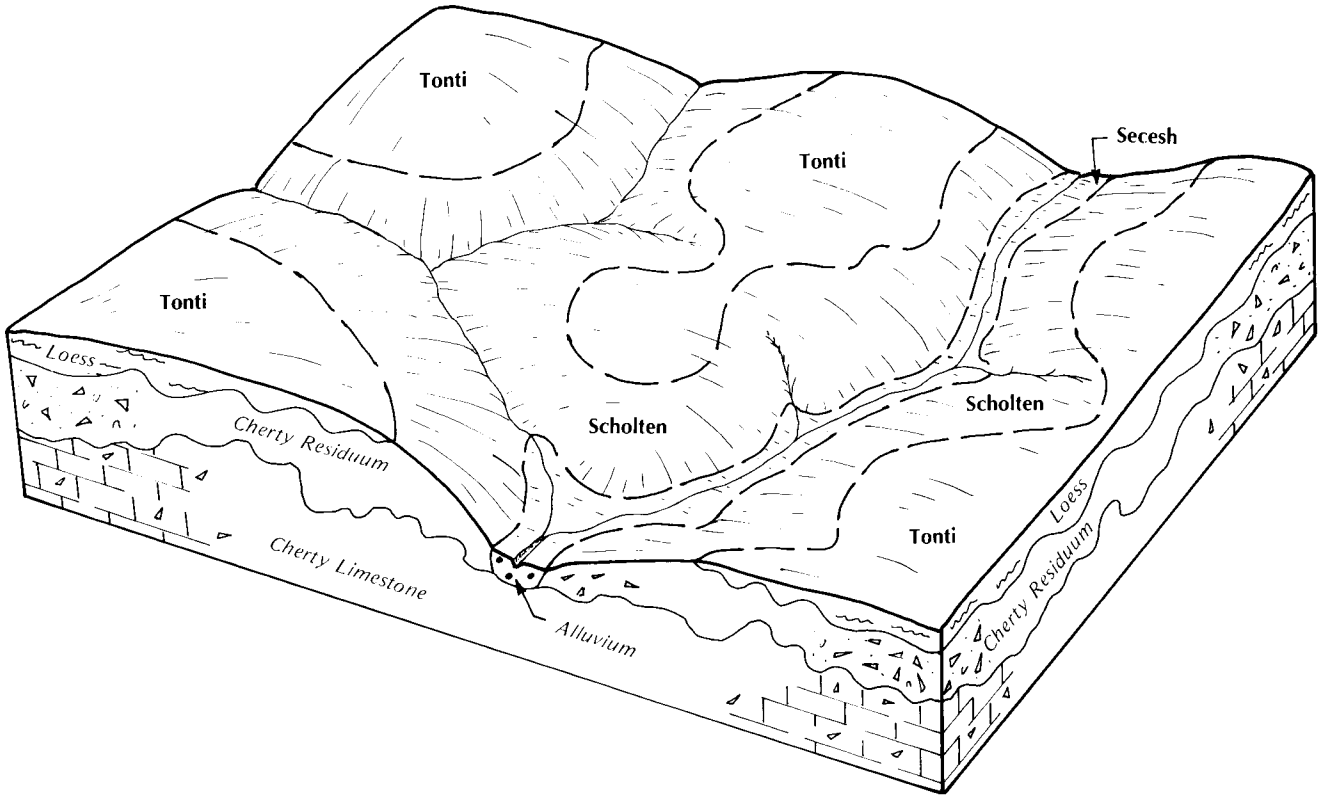

Figure 3.—Pattern of soils and parent material in the Scholten-Tonti association.

coarse fragments in the upper part of the subsoil. Yelton soils have more sand than the Tonti soils. Cedargap, Secesh, and Waben soils do not have a fragipan and are on stream terraces and flood plains. Noark soils do not have a fragipan and are on short, steep breaks and knobs. Creldon, Hoberg, and Keeno soils have a surface layer that is dark. Keeno soils are in landscape positions similar to those of the Scholten soils.

About 85 percent of this association is used for pasture and hay, 5 percent for cultivated crops, and 10 percent as woodland. These soils are suited to small grain and grain sorghum and well suited to legumes and cool- and warm-season grasses. The hazard of erosion, a low content of organic matter, the gravel in the surface layer, a restricted rooting depth, a seasonal high water table, and a low available water capacity are the main management concerns.

These soils are suited to trees. The hazard of windthrow and the seedling mortality rate are the main management concerns.

These soils are suited to building site development and to some onsite sanitary facilities. Restricted permeability and the wetness are limitations on sites for septic tank absorption fields. The wetness is a limitation on sites for dwellings and sewage lagoons.

5. Beemont-Yelton-Lily Association

Moderately deep to very deep, gently sloping to moderately steep, moderately well drained and well drained, loamy and cobbly, loamy soils; on uplands

This association is on broad ridges and monadnocks in the uplands. Scattered areas of Rock outcrop are on the side slopes of the monadnocks.

This association makes up about 2 percent of the county. It is about 48 percent Beemont soils, 19 percent Yelton soils, 13 percent Lily soils, and 20 percent minor soils.

The Beemont soils are deep and moderately well drained. They are gently sloping to moderately steep and are on foot slopes and side slopes of monadnocks. Typically, the surface layer is dark brown, very friable cobbly very fine sandy loam or loam about 4 inches thick. The subsurface layer is dark yellowish brown, very friable cobbly very fine sandy loam about 6 inches thick. The subsoil is yellowish red and red, firm clay about 34 inches thick. The substratum is yellowish red,

firm channery sandy clay loam. It is underlain by hard sandstone bedrock at a depth of about 49 inches.

The Yelton soils are very deep and moderately well drained. They are gently sloping and are on the ridges of uplands and old high terraces. Typically, the surface layer is dark brown, very friable loam about 3 inches thick. The subsoil above the fragipan is about 17 inches thick. The upper part is mixed yellowish brown, strong brown, and dark brown, friable loam and yellowish brown and strong brown, friable clay loam. Below this to a depth of 60 inches or more is a fragipan of mottled, very firm and brittle, clay loam and very channery clay loam.

The Lily soils are moderately deep and well drained. They are gently sloping and are on broad ridges and plateaus of monadnocks. Typically, the surface layer is dark brown, very friable loam about 9 inches thick. The subsoil is strong brown, friable loam in the upper part and strong brown, firm clay loam in the lower part. Hard sandstone bedrock is at a depth of about 24 inches.

The minor soils in this association are those in the Branson, Dunning, and Ramsey series. Branson soils do not have a fragipan and are more than 60 inches deep to bedrock. They are in landscape positions similar to those of the Yelton soils. Ramsey soils are less than 20 inches deep to sandstone bedrock and are in landscape positions similar to those of the Lily soils. Dunning soils have more clay throughout and are on flood plains. Also of minor extent are areas of Rock outcrop.

About 55 percent of this association is used for pasture and hay, 5 percent for cultivated crops, and 40 percent as woodland. The hazard of erosion, a low content of organic matter, the stones, a restricted rooting depth, a seasonal high water table, and a low available water capacity are the main management concerns.

These soils are moderately suited to trees. The equipment limitation, the seedling mortality rate, and the hazard of windthrow are the main management concerns.

These soils are suited to building site development and some onsite waste disposal systems. Restricted permeability, the wetness, and the slope are limitations on sites for septic tank absorption fields. The wetness and the depth to bedrock are limitations on sites for sewage lagoons. The shrink-swell potential, the depth to bedrock, and the wetness are limitations on sites for dwellings.

Dominantly Moderately Sloping to Very Steep Soils in the Ozark Highland Area

These soils are in the southern, eastern, and central parts of the county. They make up about 61.2 percent of the county. The associations in this group differ in kinds of soil and in topography.

Most of these soils are used as woodland. Many of the broad ridges are used for pasture that is interspersed with a few areas that are used for hay and cultivated crops. The hazard of erosion, the slope, and a low or very low available water capacity are the main management concerns in areas used as woodland.

6. Clarksville-Noark-Nixa Association

Very deep, gently sloping to very steep, well drained and somewhat excessively drained, very gravelly, silty soils; on uplands

This association is on the narrow ridgetops and steep side slopes of deeply dissected plateaus. It is dissected by narrow flood plains.

This association makes up about 21 percent of the county. It is about 54 percent Clarksville soils, 18 percent Noark soils, 16 percent Nixa soils, and 12 percent minor soils (fig. 4).

The Clarksville soils are somewhat excessively drained and moderately steep to very steep. They are on side slopes. Typically, the surface layer is very dark grayish brown, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is pale brown, very friable very gravelly silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown and pale brown, very friable very gravelly silt loam in the upper part; yellowish red, reddish yellow, and red, firm very gravelly silty clay loam in the next part; and dark red, firm extremely gravelly clay in the lower part.

The Noark soils are well drained and moderately sloping to moderately steep. They are on ridges. Typically, the surface layer is dark grayish brown, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is pale brown, very friable very gravelly silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown and pale brown, very friable very gravelly silt loam in the upper part; yellowish red, friable very gravelly clay in the next part; and dark red, firm extremely gravelly clay in the lower part.

The Nixa soils are moderately well drained and gently sloping to strongly sloping. They are on ridgetops and the upper side slopes. Typically, the surface layer is very dark grayish brown, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is dark grayish brown, very friable very gravelly silt loam about 7 inches thick. The upper part of the subsoil is yellowish brown, friable very gravelly silt loam and pale brown, very friable extremely gravelly silt loam about 14 inches thick. The next part is a fragipan of mottled, firm and

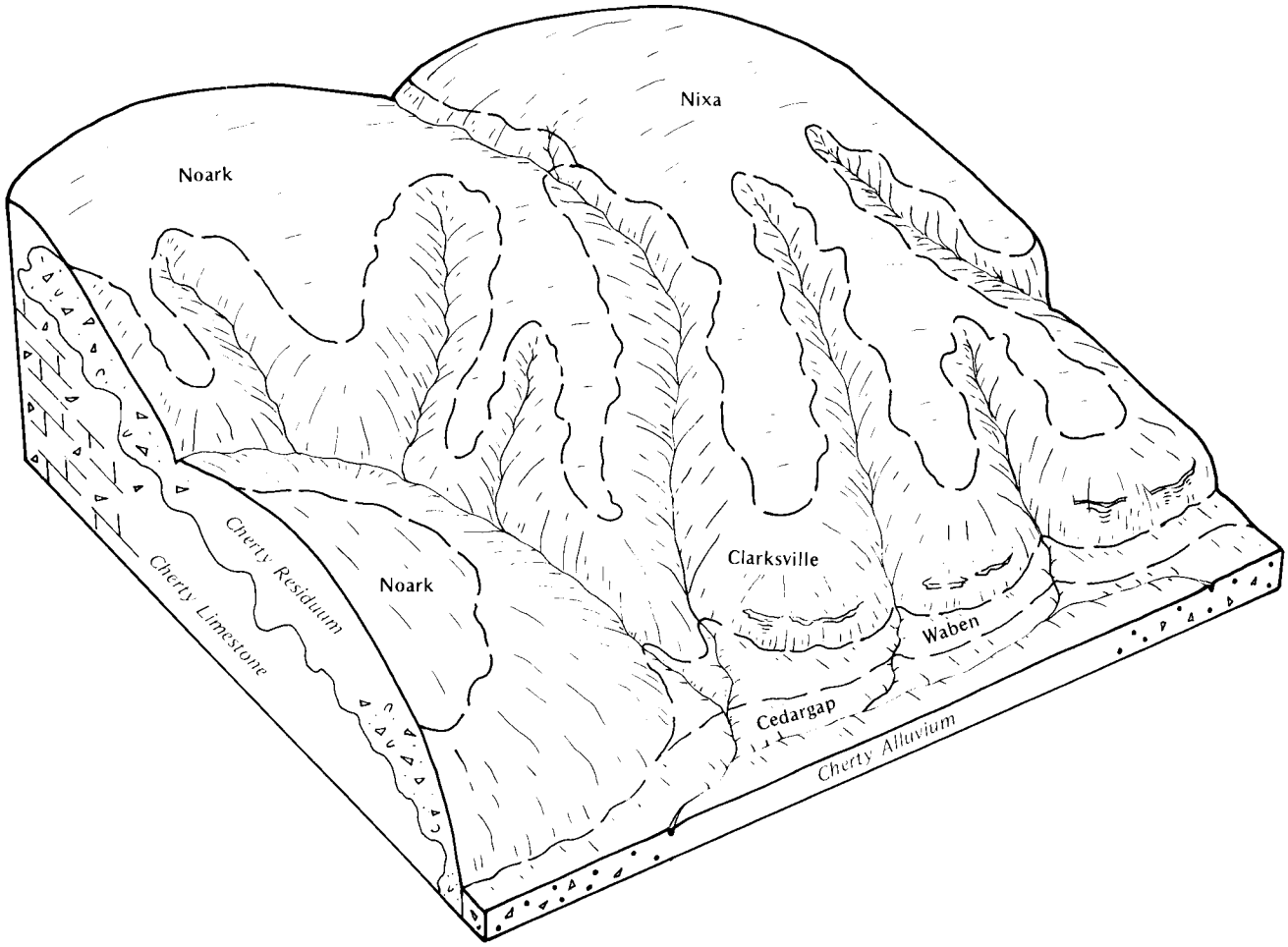

Figure 4.—Pattern of soils and parent material in the Clarksville-Noark-Nixa association.

brittle extremely gravelly and very gravelly silty clay loam about 15 inches thick. The lower part to a depth of 60 inches or more is red, mottled, firm very gravelly clay and dark reddish brown, firm gravelly clay.

The minor soils in this association are those in the Cedargap, Moko, and Waben series. Areas of Rock outcrop are also included. Cedargap and Waben soils have less clay in the subsoil than the major soils and are on flood plains and stream terraces. Moko soils are less than 20 inches deep to bedrock and are in landscape positions similar to those of the Clarksville soils. The areas of Rock outcrop are on the steep breaks that generally are adjacent to the drainageways.

About 50 percent of this association is used as woodland. Some small areas are used for hay. The remainder is used as pasture. The hazard of erosion, a low available water capacity, the gravel in the surface layer, and the slope are the main management concerns in areas used for pasture and hay.

These soils are suited to trees. The hazard of erosion, the equipment limitation, the seedling mortality rate, and the hazard of windthrow are the main management concerns.

These soils are suited to building site development and some onsite waste disposal systems. Restricted permeability and the slope are limitations on sites for septic tank absorption fields. The slope is a limitation on sites for dwellings. Seepage and the slope are limitations on sites for sewage lagoons.

7. Hailey-Rock Outcrop Association

Rock outcrop and very deep, moderately sloping to very steep, excessively drained, extremely gravelly, silty soils; on uplands

This association is on the narrow ridgetops, side slopes, and short, steep escarpments of deeply dissected plateaus. The areas of Rock outcrop occur in

a narrow band at the base of the side slopes and on nose slopes. About 50 percent of this association is located within the boundaries of the Mark Twain National Forest.

This association makes up about 15 percent of the county. It is about 65 percent Hailey soils, 14 percent Rock outcrop, and 21 percent minor soils (fig. 5).

Typically, the surface layer of the Hailey soils is very dark grayish brown, very friable extremely gravelly silt loam about 4 inches thick. The subsurface layer is dark brown, very friable extremely gravelly silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown and yellowish brown, very friable very gravelly silt loam, and the lower part is yellowish brown and light yellowish brown, very friable extremely gravelly silt loam.

The areas of Rock outcrop are on short, steep breaks near the lower edge of the association.

The minor soils in this association are those in the Moko and Nixa series. Moko soils are less than 20 inches deep to bedrock and are intermingled with areas of the Rock outcrop. The gently sloping Nixa soils have a fragipan and are on the ridgetops.

About 80 percent of this association is used as woodland. The remainder is used for pasture. The slope, a low available water capacity, the gravel in the surface layer, and the hazard of erosion are the main management concerns.

The Hailey soils are moderately suited to trees. The hazard of erosion, the equipment limitation, and the seedling mortality rate are the main management concerns.

The Hailey soils are moderately suited to building site development and some onsite waste disposal systems. The slope and restricted permeability are limitations on sites for septic tank absorption fields. The slope, the high content of gravel, and the areas of Rock outcrop are limitations on sites for dwellings. Hailey soils are unsuitable as sites for sewage lagoons.

8. Mano-Gatewood-Britwater Association

Moderately deep and very deep, gently sloping to very steep, moderately well drained and well drained, very gravelly and extremely gravelly, silty soils; on uplands and high terraces

This association is on the low ridgetops and side slopes of deeply dissected plateaus in the uplands. It is dissected by numerous small streams and drainageways.

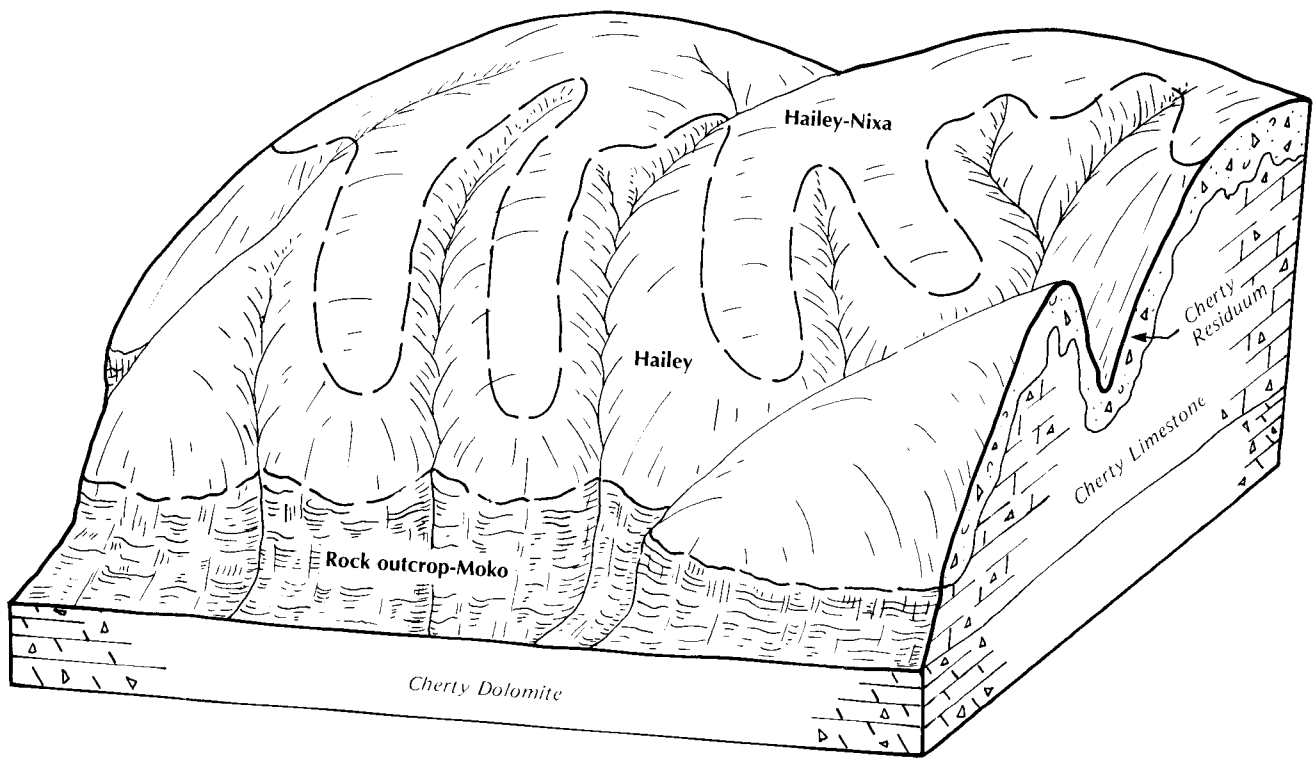

Figure 5.—Pattern of soils and parent material in the Hailey-Rock outcrop association.

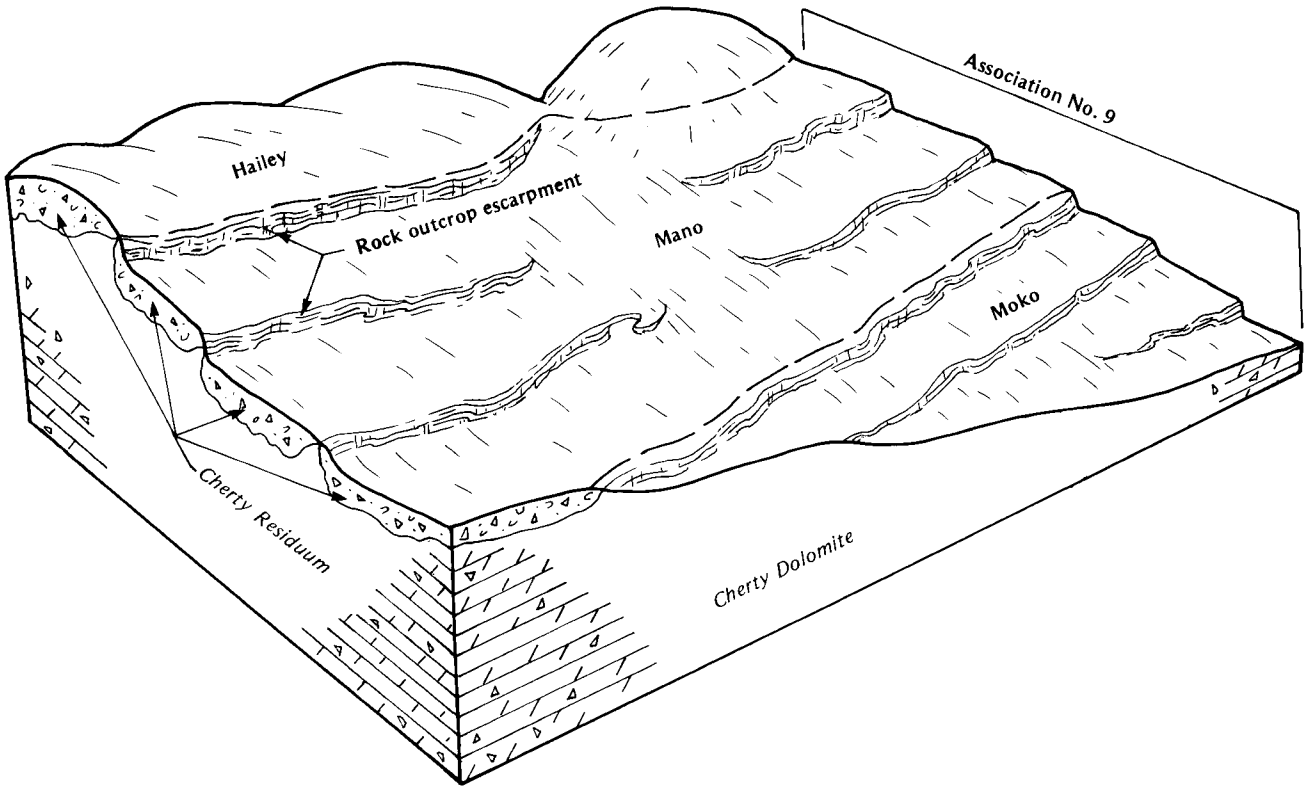

Figure 6.—Pattern of soils and parent material in the Mano-Moko-Rock outcrop association.

This association makes up about 13 percent of the county. It is about 41 percent Mano and similar soils, 19 percent Gatewood and similar soils, 15 percent Britwater soils, and 25 percent minor soils.

The Mano soils are very deep and moderately well drained. They are moderately sloping to very steep. They are on ridgetops and side slopes. Typically, the surface layer is dark grayish brown and dark gray, very friable very gravelly or extremely gravelly silt loam about 3 inches thick. The subsurface layer is pale brown, very friable very gravelly silt loam and light yellowish brown and brownish yellow, friable very gravelly silt loam about 10 inches thick. The subsoil extends to a depth of 68 inches or more. It is brownish yellow and pale brown, friable very gravelly silt loam in the upper part; light yellowish brown and brownish yellow, mottled, firm very gravelly silty clay loam in the next part; and yellowish brown, mottled, very firm clay in the lower part.

The Gatewood soils are moderately deep and moderately well drained. They are moderately sloping to very steep. They are on ridgetops and side slopes. They are lower on the landscape than the Mano soils. Typically, the surface layer is dark grayish brown, very friable very gravelly silt loam about 4 inches thick. The subsurface layer is pale brown and light yellowish brown, very friable very gravelly silt loam about 5 inches thick. The subsoil is strong brown, mottled, very firm clay in the upper part and yellowish brown, very firm clay in the lower part. Hard dolomite bedrock is at a depth of about 39 inches.

The Britwater soils are very deep and well drained. They are gently sloping. They are on old high terraces and broad ridges. Typically, the surface layer is dark brown, very friable gravelly silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is dark brown, very friable gravelly silty clay loam and strong brown, friable gravelly silty clay loam in the upper part and yellowish red and red, friable very gravelly and extremely gravelly silty clay loam in the lower part.

The minor soils in this association are those in the Hercules, Moko, Portia, Viraton, and Waben series. Moko soils are less than 20 deep inches to bedrock and are on breaks and benches. Hercules soils are gravelly throughout and are on narrow flood plains. Portia soils are sandy and are on low stream terraces. Viraton soils have a fragipan and are in landscape positions similar

to those of the Britwater soils. Waben soils are gravelly throughout and are on stream terraces and alluvial fans.

About 75 percent of this association is used for pasture and hay, 15 percent as woodland, 5 percent for cultivated crops, and 5 percent for housing development. The hazard of erosion, the stones, the gravel in the surface layer, and a low available water capacity are the main management concerns in areas used for pasture, hay, or cultivated crops.

These soils are suited to trees. The seedling mortality rate and the hazard of windthrow are the main management concerns.

These soils are suited to building site development and some onsite waste disposal systems. The depth to bedrock and restricted permeability are limitations on sites for septic tank absorption fields. The depth to bedrock, the shrink-swell potential, and the slope are the main limitations on sites for dwellings. The depth to bedrock, the slope, and seepage are the main limitations on sites for sewage lagoons.

9. Mano-Moko-Rock Outcrop Association

Rock outcrop and very shallow, shallow, and very deep, moderately sloping to very steep, moderately well drained and well drained, very gravelly, extremely gravelly, flaggy, and very flaggy, silty soils; on uplands

This association is on the steep side slopes of deeply dissected plateaus. The major soils commonly have areas of gravelly colluvium on the surface. They typically are in a stairstep pattern on benches and commonly follow the contour of the landscape.

This association makes up about 11 percent of the county. It is about 35 percent Mano and similar soils, 24 percent Moko and similar soils, 21 percent Rock outcrop, and 20 percent minor soils (fig. 6).

The Mano soils are very deep and moderately well drained. Typically, the surface layer is dark grayish brown and dark gray, very friable very gravelly or extremely gravelly silt loam about 3 inches thick. The subsurface layer is pale brown, very friable very gravelly silt loam and light yellowish brown and brownish yellow, friable very gravelly silt loam about 10 inches thick. The subsoil extends to a depth of 68 inches or more. It is brownish yellow and pale brown, friable very gravelly silt loam in the upper part; light yellowish brown and brownish yellow, mottled, firm very gravelly silty clay loam in the next part; and yellowish brown, mottled, very firm clay in the lower part.

The Moko soils are very shallow or shallow and are well drained. Typically, the surface layer is black, very friable flaggy silty clay loam about 8 inches thick. The subsoil is black, very friable very flaggy silty clay loam. Hard dolomite bedrock is at a depth of about 16 inches.

The areas of Rock outcrop are on short, steep breaks throughout the association.

The minor soils in this association are those in the Blueye, Hercules, and Snead series. Blueye soils have a surface layer that is dark. They have bedrock at a depth of 40 to 60 inches and are in landscape positions similar to those of the Mano soils. Hercules soils are very gently sloping and gently sloping and are on narrow flood plains. Snead soils have shale bedrock at a depth of 20 to 40 inches and are in landscape positions similar to those of the Mano soils.

About 80 percent of this association is used as woodland. The remainder is used for pasture. The slope, a low or very low available water capacity, the gravel in the surface layer, and the hazard of erosion are the main management concerns.

The major soils are suited to trees. The hazard of erosion, the equipment limitation, the seedling mortality rate, and the hazard of windthrow are the main management concerns.

The major soils generally are not suited to building site development and onsite waste disposal systems because of the depth to bedrock, the slope, and restricted permeability.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Scholten gravelly silt loam, 3 to 9 percent slopes, is a phase of the Scholten series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Tonti-Scholten complex, 2 to 6 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Pits-Dumps complex is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

The descriptions, names, and delineations of the soils identified on the soil maps of this county do not fully agree with those in the surveys of adjacent counties published at a different date. Differences may be the result of additional soil data, variations in the intensity of mapping, or correlation decisions that reflect local conditions.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils.

Soil Descriptions

11B—Pembroke silt loam, 1 to 3 percent slopes. This very deep, very gently sloping, well drained soil is on broad ridges in the uplands. Individual areas are rectangular and range from about 30 to more than 100 acres in size.

Typically, the surface layer is dark brown, very friable silt loam about 10 inches thick. The subsurface layer is dark brown and very dark grayish brown, very friable silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is brown and reddish brown, friable silty clay loam in the upper part; reddish brown and red, friable silty clay loam in the next part; and dark reddish brown, friable silty clay in the lower part. In eroded areas the surface layer is brown or reddish brown silty clay loam.

Included with this soil in mapping are small areas of Barden soils and areas of a soil that has a fragipan. The soil that has a fragipan is in the higher landscape positions. Barden soils are somewhat poorly drained and are in the lower landscape positions. Included soils make up about 10 percent of the map unit.

Permeability is moderate in the Pembroke soil. Surface runoff is medium. Available water capacity is high. Organic matter content is moderate, and natural fertility is medium. The shrink-swell potential is moderate below a depth of 30 inches. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is very good.

Most areas are used for cultivated crops, pasture, or hay. This soil is suited to small grain, soybeans, and grain sorghum. The hazard of erosion is moderate. It restricts the choice of crops unless conservation practices are applied. A combination of terraces and grassed waterways or tile outlets help to control erosion in areas that have a high percentage of intensively cultivated row crops. A conservation cropping system that includes pasture or hay crops in the rotation, contour farming, and a system of conservation tillage that leaves a protective cover of crop residue on the surface also help to control erosion. Crop residue management helps to maintain the content of organic matter and the tilth and increases the rate of water infiltration.

This soil is well suited to such commonly grown legumes as alfalfa and red clover, to such warm-season grasses as bermudagrass, Caucasian bluestem, and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. Erosion is a hazard in newly seeded areas. Timely seedbed preparation helps to ensure a good ground cover.

Because ponds in areas of this soil have a high seepage rate, the amount of available livestock water may be limited. Embankments for farm ponds and lakes are difficult to pack and seal. Chemical additives or a blanket of suitable soil material can reduce the seepage rate. In some areas deep wells provide livestock water.

This soil is suited to trees. No major management concerns affect planting or harvesting.

This soil is suited to building site development and to most onsite waste disposal systems. The shrink-swell potential is the main limitation affecting the construction of dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel help to prevent the structural damage caused by shrinking and swelling. Septic tank absorption fields function adequately if they are properly constructed. Seepage is a hazard on sites for sewage lagoons. Sealing the bottom and berms of sewage lagoons with slowly permeable material helps to prevent seepage and the contamination of ground water. Community sewers should be used if they are available.

Low strength, the shrink-swell potential, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or some other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing adequate roadside ditches, and installing culverts improve drainage and thus minimize the damage caused by shrinking and swelling and by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

15C—Scholten gravelly silt loam, 3 to 9 percent slopes. This very deep, gently sloping and moderately sloping, moderately well drained soil is on the top and side slopes of ridges in the uplands. Individual areas are broad and oval and have fingerlike protrusions. They range from 5 to more than 300 acres in size.

Typically, the surface layer is dark grayish brown and dark brown, very friable gravelly silt loam about 6 inches thick. The subsurface layer is light yellowish brown and yellowish brown, very friable gravelly silt loam about 3 inches thick. The upper part of the subsoil is yellowish brown, friable very gravelly silty clay loam about 15 inches thick. The next part is a fragipan of mottled, very firm and brittle very gravelly silt loam about 9 inches thick. The lower part to a depth of 60 inches or more is dark red, mottled, firm gravelly clay. In some places the upper part of the subsoil has less clay, and in other places it has less than 35 percent chert.

Included with this soil in mapping are small areas of Cedargap, Clarksville, Noark, and Waben soils. Cedargap and Waben soils are on flood plains and stream terraces. Clarksville and Noark soils are on knobs and steep, short breaks. The included soils do not have a fragipan. They make up about 5 to 10 percent of the map unit.

Permeability is moderate above the fragipan in the Scholten soil, very slow in the fragipan, and moderately rapid below the fragipan. Surface runoff is medium. Available water capacity is low. Organic matter content and natural fertility also are low. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 24 inches. The response to soil amendments is fair.

Most areas are used for pasture or hay. Some small areas support native hardwoods. Only a few small areas are used for cultivated crops. This soil is suited to

small grain and grain sorghum. The hazard of erosion, the content of gravel, and the seasonal wetness are management concerns. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during the summer. Contour farming and a combination of terraces and grassed waterways help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible. The gravel can hinder tillage and haying. Using a heavy roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years.

This soil is suitable as a site for ponds and lakes. On sites that require excavations to a depth of 4 feet or more, seepage is a hazard. It generally can be controlled by keeping the excavation shallow and by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

This soil is suited to trees. The hazard of windthrow and the seedling mortality rate are management concerns. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely. Reinforcement planting or selection of container-grown stock increases the seedling survival rate.

This soil is suited to building site development and to some onsite waste disposal systems. The shrink-swell potential and the wetness are limitations on sites for dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping can improve surface drainage and thus reduce the wetness on sites for dwellings with basements. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom and berms of the lagoons should be sealed with slowly permeable material if they are constructed below the fragipan.

The wetness and the potential for frost action are limitations on sites for local roads and streets. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts improve drainage and thus minimize the damage caused by wetness and frost action.

The land capability classification is IVs. The woodland ordination symbol is 2D.

16B—Creldon silt loam, 1 to 3 percent slopes. This very deep, very gently sloping, moderately well drained soil is on the top of broad ridges in the uplands. Individual areas are irregular in shape and range from 10 to more than 50 acres in size.

Typically, the surface layer is very dark grayish brown, very friable silt loam about 10 inches thick. The upper part of the subsoil is about 17 inches thick. It is dark brown, friable silty clay loam and mottled, dark brown and yellowish brown, firm silty clay. The next part is a fragipan of mottled, firm and brittle, very gravelly silty clay loam about 23 inches thick. The lower part to a depth of 60 inches or more is dark red, firm very gravelly clay. In some places the subsoil above the fragipan has more gravel and less clay. In other places it is somewhat poorly drained.

Permeability is moderately slow above the fragipan in the Creldon soil, very slow in the fragipan, and moderate below the fragipan. Surface runoff is medium. Available water capacity is moderate. Organic matter content is moderate, and natural fertility is medium. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 27 inches. The shrink-swell potential is moderate. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is good.

Most areas are used for cultivated crops. Some areas are used for pasture or hay. This soil is suited to small grain, soybeans, and grain sorghum. The hazard of erosion and the seasonal wetness are management concerns. An insufficient supply of moisture commonly is a limitation affecting crops grown during the summer. Conservation practices are needed to help control erosion. A combination of terraces and grassed

waterways or tile outlets, a system of conservation tillage that leaves a protective cover of crop residue on the surface, and contour farming help to control erosion and reduce the runoff rate. Grasses, legumes, and grain crops can be grown in rotation. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. On sites that require excavations to a depth of 4 feet or more, seepage is a hazard. It generally can be controlled by keeping the excavation shallow and by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

This soil is suited to building site development and to some onsite waste disposal systems. The shrink-swell potential and the wetness are limitations on sites for dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping can improve surface drainage and thus reduce the wetness on sites for dwellings with basements. The seasonal wetness and restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom and berms of the lagoons should be sealed with slowly permeable material if they are constructed below the fragipan.

Low strength, the wetness, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts improve drainage and thus minimize the damage caused by frost action.

The land capability classification is IIe. No woodland ordination symbol is assigned.

18B—Captina silt loam, 1 to 3 percent slopes. This very deep, very gently sloping, moderately well drained soil is on broad ridgetops in the uplands. Individual areas are elongated and range from 5 to more than 80 acres in size.

Typically, the surface layer is dark brown, very friable silt loam about 9 inches thick. The upper part of the subsoil is strong brown and yellowish red, friable silty clay loam about 15 inches thick. The next part to a depth of 60 inches or more is a fragipan of mottled, very firm and brittle, silty clay loam. In some places the upper part of the subsoil has gray mottles. In other places the subsoil above the fragipan has more than 15 percent gravel.

Included with this soil in mapping are small areas of Scholten and Branson soils. Scholten soils are gravelly throughout and are on breaks and the steeper slopes. Branson soils do not have a fragipan and are in landscape positions similar to those of the Captina soil. Included soils make up about 10 percent of the map unit.

Permeability is moderate above and below the fragipan in the Captina soil and slow in the fragipan. Surface runoff is medium. Available water capacity is moderate. Organic matter content is moderately low, and natural fertility is low. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 24 inches. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust or puddle, however, after heavy rainfall. The response to soil amendments is good.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. A few small areas support native hardwoods. This soil is suited to soybeans, small grain, and grain sorghum. The hazard of erosion and the seasonal wetness are the main management concerns. An insufficient supply of moisture commonly is a limitation affecting crops grown during the summer. Contour farming and a combination of terraces and grassed waterways or tile outlets help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic

matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. The rooting depth is only moderate. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. On sites that require excavation to a depth of 4 feet or more, seepage is a hazard. It generally can be controlled by keeping the excavation shallow and by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

This soil is suited to trees. The hazard of windthrow is a management concern. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely.

This soil is suited to building site development and to some onsite waste disposal systems. The wetness is a limitation on sites for dwellings. Constructing footings and foundations with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping can improve surface drainage and thus reduce the wetness on sites for dwellings with basements. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom of the lagoons should not be below the bottom of the fragipan.

Low strength, the wetness, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts improve drainage and thus minimize the damage caused by wetness and frost action.

The land capability classification is IIe. The woodland ordination symbol is 3D.

19B—Needleye silt loam, 1 to 3 percent slopes. This very deep, very gently sloping, somewhat poorly drained soil is on broad ridges in the uplands. Individual areas are oval and range from about 5 to 15 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 5 inches thick. The upper part of the subsoil is about 18 inches thick. It is yellowish brown, mottled, friable silty clay loam in the upper part and light brownish gray and yellowish brown, friable silty clay loam in the lower part. The next part is a fragipan of mottled, very firm and brittle very gravelly silty clay loam about 21 inches thick. The lower part to a depth of 60 inches or more is dark red, mottled, firm very gravelly clay. In some places the subsoil above the fragipan is not as gray. In other places it is more gray throughout. In some areas the subsoil has more than 15 percent gravel.

Included with this soil in mapping are small areas of Racoon soils. Racoon soils do not have a fragipan and commonly are in the center of the map unit. They make up about 10 percent of the map unit.

Permeability is moderately slow above the fragipan in the Needleye soil, very slow in the fragipan, and moderate below the fragipan. Surface runoff is medium. Available water capacity is moderate. Organic matter content is moderately low, and natural fertility is low. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 23 inches. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust, however, after heavy rainfall.

Most areas are used for pasture or hay. Some areas support native hardwoods. A few areas are used for cultivated crops. This soil is suited to small grain and grain sorghum. The hazard of erosion and the seasonal wetness are management concerns. An insufficient supply of moisture commonly is a limitation affecting crops grown during the summer. Contour farming and a combination of terraces and grassed waterways or tile outlets help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season

grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. On sites that require excavations to a depth of 4 feet or more, seepage is a hazard. It generally can be controlled by keeping the excavation shallow and by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

This soil is suited to trees. The hazard of windthrow and the seedling mortality rate are management concerns. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

This soil is suited to building site development and to some onsite waste disposal systems. The wetness is a limitation on sites for dwellings. Installing tile drains around footings and basement walls helps to prevent damage to dwellings caused by the excessive wetness. Land shaping can improve surface drainage and thus reduce the wetness on sites for dwellings with basements. Constructing footings and foundations with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom and berms of the lagoons should be sealed with slowly permeable material if they are constructed below the fragipan.

Low strength, the wetness, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts improve drainage and thus minimize the damage caused by wetness and frost action.

The land capability classification is IIe. The woodland ordination symbol is 3D.

20B—Branson silt loam, 1 to 3 percent slopes. This very deep, very gently sloping, well drained soil is on broad ridges in the uplands. Individual areas are rectangular and range from about 10 to more than 200 acres in size.

Typically, the surface layer is very dark grayish brown, very friable silt loam about 4 inches thick. The subsurface layer is dark brown, very friable silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown, friable silty clay loam in the upper part; red, dark red, and brown, firm silty clay in the next part; and dark red, mottled, firm silty clay and clay in the lower part. In some places the dark surface layer is more than 7 inches thick. In other places the subsoil has more than 15 percent gravel.

Included with this soil in mapping are small areas of Captina soils. Captina soils have a fragipan and are in landscape positions similar to those of the Branson soil. They make up about 5 percent of the map unit.

Permeability is moderate in the Branson soil. Surface runoff is medium or slow. Available water capacity is high. Organic matter content is moderately low, and natural fertility is medium. The surface layer is friable and can be worked throughout a wide range in moisture content. The response to soil amendments is very good.

Most areas are used for cultivated crops, pasture, or hay. This soil is suited to soybeans, small grain, and grain sorghum. Erosion is a hazard. It restricts the choice of crops unless moderate conservation practices are applied. A combination of terraces and grassed waterways or tile outlets help to control erosion in areas that have a high percentage of intensively cultivated row crops. A conservation cropping system that includes pasture or hay crops in the rotation, contour farming, and a system of conservation tillage that leaves a protective cover of crop residue on the surface also help to control erosion. Crop residue management helps to maintain the content of organic matter, improves tilth, and increases the rate of water infiltration.

This soil is well suited to such commonly grown legumes as alfalfa and red clover, to such warm-season grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. Erosion is a hazard in newly seeded areas. Timely seedbed preparation helps to ensure a good ground cover.

This soil is suited to trees. No major management concerns affect planting or harvesting (fig. 7).

Because ponds in areas of this soil have a high seepage rate, the amount of available livestock water may be limited. Embankments for farm ponds and lakes are difficult to pack and seal. Chemical additives or a blanket of suitable soil material can reduce the seepage

Figure 7.—A stand of oak trees in an area of Branson silt loam, 1 to 3 percent slopes.

rate. In some areas deep wells provide livestock water.

This soil is suited to building site development and to most onsite waste disposal systems. The shrink-swell potential is a limitation on sites for dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings helps to prevent the damage to buildings caused by the wetness. The restricted permeability is a limitation on sites for septic tank absorption fields. These fields function adequately if the size is increased or if a mound system is used. The hazard of seepage is moderate on sites for sewage lagoons. Sealing the bottom and berms of the lagoon with slowly permeable material helps to prevent seepage and the contamination of ground water. Community sewers should be used if they are available.

Low strength and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or some other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing adequate roadside

ditches, and installing culverts minimize the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

21B—Claiborne silt loam, 2 to 5 percent slopes. This very deep, gently sloping, well drained soil is on high stream terraces and toe slopes along secondary streams. Individual areas are narrow and elongated and range from 5 to more than 100 acres in size.

Typically, the surface layer is dark brown, very friable silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. In sequence downward it is dark brown, friable silt loam; reddish brown, friable gravelly silty clay loam; yellowish red, friable gravelly silty clay loam; and yellowish red and red, friable very gravelly silty clay loam. In some places the soil is very gravelly throughout. In other places the subsoil has less than 15 percent gravel. In some areas the slope is more than 5 percent.

Included with this soil in mapping are small areas of Tonti soils. Tonti soils have a fragipan and are in the center of the larger mapped areas of the Claiborne soil. They make up about 10 percent of the map unit.

Permeability is moderate in the Claiborne soil. Surface runoff is medium. Available water capacity is high. Organic matter content is moderately low, and natural fertility is medium. The shrink-swell potential is moderate. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is very good.

Most areas are used for pasture or hay. A few small areas are used for cultivated crops. This soil is suited to small grain and grain sorghum. Because of extensive cultivation in the past, some areas are severely eroded. A combination of terraces and grassed waterways or tile outlets and contour farming help to control erosion in areas that have a high percentage of intensively cultivated row crops. A conservation cropping system that includes pasture or hay crops in the rotation and a system of conservation tillage that leaves a protective cover of crop residue on the surface also help to control erosion. Crop residue management helps to maintain the content of organic matter, improves tilth, and increases the rate of water infiltration.

This soil is well suited to such commonly grown legumes as alfalfa and red clover, to such warm-season grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. Erosion is a hazard in newly seeded areas. Timely seedbed preparation helps to ensure a good ground cover.

This soil is suited to trees. No major management concerns affect planting or harvesting.

Because ponds in areas of this soil have a high seepage rate, the amount of available livestock water may be limited. Embankments for farm ponds and lakes are difficult to pack and seal. Chemical additives or a blanket of suitable soil material can reduce the seepage rate. In some areas deep wells provide livestock water.

This soil is suited to building site development and to most onsite waste disposal systems. The shrink-swell potential is the main limitation on sites for dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel help to prevent the structural damage caused by shrinking and swelling. The restricted permeability is a limitation on sites for septic tank absorption fields. These fields can function adequately if the size of the field is increased or if a mound is constructed. Seepage can be a hazard on sites for sewage lagoons. Sealing the bottom and berms of the lagoon helps to prevent seepage and the contamination of ground water. Community sewers should be used if they are available.

Low strength, the shrink-swell potential, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or some other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing adequate roadside ditches, and installing culverts for drainage minimizes the damage caused by shrinking and swelling and by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

22B—Britwater gravelly silt loam, 2 to 5 percent slopes. This very deep, gently sloping, well drained soil is on stream terraces and low ridges in the uplands. Individual areas are elongated and range from 5 to more than 40 acres in size.

Typically, the surface layer is dark brown, very friable gravelly silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is dark brown, very friable gravelly silty clay loam and strong brown, friable gravelly silty clay loam in the upper part and yellowish red, friable very gravelly silty clay loam and red, friable extremely gravelly silty clay loam in the lower part. In some places bedrock is at a depth of 40 to 60 inches. In other places the subsoil has more clay.

Included with this soil in mapping are small areas of Mano and Ocie soils. Mano and Ocie soils have more clay and less chert in the subsoil than the Britwater soil and are in similar landscape positions. In places the surface layer is silt loam. Included soils make up about 5 percent of the map unit.

Permeability is moderate in the Britwater soil.

Surface runoff is medium. Available water capacity is moderate. Organic matter content is low, and natural fertility is medium. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is very good.

Most areas are used for pasture or hay. A few small areas are used for cultivated crops. This soil is suited to small grain and grain sorghum. Because of extensive cultivation in the past, some areas are severely eroded. A combination of terraces and grassed waterways or tile outlets and contour farming help to control erosion in areas that have a high percentage of intensively cultivated row crops. A conservation cropping system that includes pasture or hay crops in the rotation and a system of conservation tillage that leaves a protective cover of crop residue on the surface also help to control erosion. Crop residue management helps to maintain the content of organic matter, improves tilth, and increases the rate of water infiltration.

This soil is well suited to such commonly grown legumes as alfalfa and red clover, to such warm-season grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. Erosion is a hazard in newly seeded areas. Timely seedbed preparation helps to ensure good ground cover.

These soils are suited to trees. No major management concerns affect planting or harvesting.

Because ponds in areas of this soil have a high seepage rate, the amount of available livestock water may be limited. Embankments for farm ponds and lakes are difficult to pack and seal. Chemical additives or a blanket of suitable soil material can reduce the seepage rate. In some areas deep wells are used to provide livestock water.

This soil is suited to building site development and to most onsite waste disposal systems. There are no limitations on sites for dwellings. Constructing footings and foundations with adequately reinforced concrete and backfilling with sand or gravel, however, minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings helps to prevent the wetness around foundations and in basements caused by the poor drainage. These soils generally are not suited to septic tank absorption fields because of the restricted permeability. Seepage is a hazard on sites for sewage lagoons. Sealing the bottom and berms of the lagoon with slowly permeable material helps to prevent seepage and the contamination of ground water. Community sewers should be used if they are available.

Low strength and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or some other suitable base material minimizes the damage caused by low strength. Grading the roads so they shed water, constructing adequate roadside ditches, and installing culverts for drainage minimize the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

23B—Lily-Ramsey complex, 2 to 5 percent slopes. These moderately deep and shallow, gently sloping, well drained and somewhat excessively drained soils are on broad ridges and plateaus of monadnocks in the uplands. The unit is about 55 percent Lily soil and 35 percent Ramsey soil. The two soils occur as areas so small or narrow that they could not be mapped separately at the scale selected for mapping. Individual areas are elongated or oval and range from 5 to more than 100 acres in size.

Typically, the surface layer of the Lily soil is dark brown, very friable loam about 9 inches thick. The subsoil is strong brown, friable loam in the upper part and strong brown, firm clay loam in the lower part. Hard sandstone bedrock is at a depth of about 24 inches.

Typically, the surface layer of the Ramsey soil is dark brown, friable fine sandy loam about 4 inches thick. The subsoil is dark yellowish brown, friable fine sandy loam about 7 inches thick. Hard sandstone bedrock is at a depth of about 11 inches. In places the surface layer is very dark grayish brown.

Included with these soils in mapping are small areas of Beemont and Yelton soils. Beemont soils are 40 to 60 inches deep to bedrock and are on foot slopes and side slopes. Yelton soils have a fragipan and are on old high terraces and in landscape positions similar to those of the Lily soil. Included soils make up about 10 percent of the map unit.

Permeability is moderately rapid in the Lily soil and rapid in the Ramsey soil. Surface runoff is medium on both soils. Available water capacity is low in the Lily soil and very low in the Ramsey soil. Organic matter content and natural fertility are low in both soils. The rooting depth is restricted by sandstone bedrock at a depth of about 24 inches in the Lily soil and at a depth of about 11 inches in the Ramsey soil. The surface layer of both soils is friable and very friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is poor.

Most areas are used for pasture. A few small areas are used for cultivated crops. Because of cultivation practices in the past, some areas are severely eroded. Some small areas support native hardwoods. These soils are not suited to cultivated crops because of a low or very low available water capacity and the depth to bedrock.

These soils are suited to such legumes as lespedeza

and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. They are moderately suited to bermudagrass and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

These soils generally are not suited to ponds or lakes because of the depth to bedrock and the hazard of seepage.

These soils are moderately suited to trees. The hazard of windthrow and the seedling mortality rate are management concerns in areas of the Ramsey soil. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils generally are not used for building site development and onsite waste disposal systems because of the depth to bedrock. If the soils are used for building site development, the design of the structures should be adapted to the specific site.

The land capability classification is VIe. The woodland ordination symbol is 3A for the Lily soil and 2D for the Ramsey soil.

24A—Parsons-Barden-Carytown silt loams, 0 to 3 percent slopes. These very deep, nearly level and very gently sloping, somewhat poorly drained, moderately well drained and poorly drained soils are on stream terraces and low uplands. The unit is about 35 percent Parsons soil, 30 percent Barden soil, and 25 percent Carytown soil. The three soils occur as areas so small that they could not be mapped separately at the scale used for mapping. Individual areas are broad and elongated and range from 10 to more than 80 acres in size.

Typically, the surface layer of the Parsons soil is very dark grayish brown, very friable silt loam about 8 inches thick. The subsurface layer is grayish brown, very friable silt loam about 3 inches thick. The subsoil is about 29 inches thick. It is very dark grayish brown, firm clay in the upper part; grayish brown, mottled, firm and dark grayish brown, firm clay in the next part; and mottled gray and brownish yellow, firm clay in the lower part. The substratum to a depth of 60 inches or more is mottled gray and brownish yellow, firm clay.

Typically, the surface layer of the Barden soil is very dark gray, very friable silt loam about 12 inches thick. The subsoil extends to a depth of about 40 inches. It is dark yellowish brown, friable silty clay loam in the upper part; dark brown, friable silty clay loam in the next part; and yellowish brown, friable clay loam in the lower part. The substratum to a depth of 60 inches or more is mottled, friable clay loam, sandy clay loam, and silty clay loam.

Typically, the surface layer of the Carytown soil is dark grayish brown and dark gray, very friable silt loam about 10 inches thick. The subsurface layer is grayish brown, very friable silt loam about 6 inches thick. The subsoil extends to a depth of about 38 inches. It is mottled dark grayish brown, yellowish brown, and very dark gray, firm clay in the upper part and mottled dark grayish brown, light olive brown, and very dark grayish brown, firm clay in the lower part. The substratum to a depth of 60 inches or more is gray, mottled, firm clay.

Included with these soils in mapping are small areas of Dunning and Racoon soils. Dunning soils are darker throughout than the Parsons, Barden, and Carytown soils and are on flood plains. Racoon soils have less clay in the subsoil than the Parsons, Barden, and Carytown soils and are on high flood plains. Included soils make up about 10 percent of the map unit.

Permeability is very slow in the Carytown and Parsons soils and slow in the Barden soil. Surface runoff is very slow on the Parsons soil, slow on the Carytown soil, and moderate on the Barden soil. Available water capacity is high in the Barden soil and moderate in the Carytown and Parsons soils. Organic matter content is moderately low in the Parsons and Barden soils and low in the Carytown soil. Natural fertility is medium in all three soils. The shrink-swell potential is high. During most winter and spring months, a perched water table is at a depth of 0.5 foot to 1.5 feet in the Parsons soil, at a depth of 2 to 3 feet in the Barden soil, and within a depth of 1 foot in the Carytown soil. The surface layer of the three soils is very friable and can be easily tilled throughout a wide range in moisture content. It tends to crust or puddle, however, after heavy rainfall. The response to soil amendments is good.

Most areas are used for cultivated crops. Small grain, soybeans, and grain sorghum are the main crops. Some crop rotations include grasses and legumes for hay and pasture. The wetness and the hazard of erosion are management concerns. Land grading can improve surface drainage. Runoff can result in erosion. Constructing field ditches and diversions across the slope helps to drain the excess water, which reduces the velocity and volume of the runoff. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

These soils are suited to most grasses and legumes used for pasture and hay. They are moderately suited

or poorly suited to alfalfa because of the restricted permeability and the poor drainage. Because areas of these soils are nearly level and very gently sloping, grasses and legumes are usually managed for hay. Constructing ditches and diversions helps to drain excess water and thus helps to prevent damage to grasses and legumes during wet periods.

These soils are well suited to ponds and lakes.

These soils are suited to building site development and to some onsite waste disposal systems. The wetness and the high shrink-swell potential are limitations on sites for dwellings. Land grading and shallow surface ditches improve drainage. Diversion ditches help to control seepage and runoff from the higher adjacent slopes. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings and foundations helps to prevent the damage caused by the excessive wetness. Because of the high corrosivity of metals and the moderate corrosivity of concrete, it may be necessary to coat surfaces that are exposed to the soil with a substance such as asphalt. Sewage lagoons function adequately if properly constructed. Septic tank absorption fields do not function adequately because of the wetness and the restricted permeability. Community sewer systems should be used if they are available.

Low strength, the wetness, the shrink-swell potential, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing adequate roadside ditches, installing culverts for drainage, and constructing the roads on raised, well compacted fill material can minimize the damage caused by wetness, by shrinking and swelling, and by frost action.

The land capability classification is IIIe. No woodland ordination symbol is assigned for these soils.

26B2—Yelton loam, 2 to 5 percent slopes, eroded. This very deep, gently sloping, moderately well drained soil is on old high terraces and ridges in the uplands. Individual areas are irregular in shape and range from 10 to more than 100 acres in size.

Typically, the surface layer is dark brown, very friable loam about 3 inches thick. The subsoil above the fragipan is about 17 inches thick. The upper part is dark brown, friable loam and yellowish brown and strong brown, friable clay loam. Below this to a depth of 60 inches or more is a fragipan of mottled, very firm and brittle clay loam and very channery clay loam. In places the soil has less sand throughout. In other places the soil has less sand and more than 15 percent chert fragments in the subsoil.

Included with this soil in mapping are small areas of Beemont, Lily, and Branson soils and some random areas that are severely eroded. Beemont and Lily soils do not have a fragipan and are on side slopes and plateaus of monadnocks. Branson soils do not have a fragipan and are in landscape positions similar to those of the Yelton soil. Included soils make up about 10 percent of the map unit.

Permeability is moderate above the fragipan in the Yelton soil and slow in and below the fragipan. Surface runoff is medium. Available water capacity is low. Organic matter content and natural fertility also are low. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 20 inches. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is good.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. A few areas support native hardwoods. This soil is suited to small grain and grain sorghum. The hazard of erosion and the seasonal wetness are management concerns. An insufficient supply of moisture commonly is a limitation affecting cultivated crops during the summer. A combination of terraces and grassed waterways or tile outlets and contour farming help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. The slope can be modified to increase the volume of the ponds and lakes. Embankments are difficult to pack and seal.

This soil is suited to trees. The seedling mortality rate and the hazard of windthrow are management concerns. Reinforcement planting or selection of

container-grown nursery stock increases the seedling survival rate. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely.

This soil is suited to building site development and to some onsite waste disposal systems. The wetness is a limitation on sites for dwellings. Constructing footings and foundations with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping can improve surface drainage and thus reduce the wetness on sites for dwellings. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. Absorption fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom of the lagoons should not be below the bottom of the fragipan.

The wetness and the potential for frost action are limitations on sites for local roads and streets. Grading the roads so that they will shed water, constructing roadside ditches, and installing culverts minimize the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 3D.

27E—Beemont cobbly very fine sandy loam, 5 to 20 percent slopes, extremely stony. This deep, moderately sloping to moderately steep, moderately well drained soil is on side slopes of monadnocks in the uplands. Stones and boulders cover about 3 to 10 percent of the surface. Individual areas are narrow and elongated and range from 20 to more than 100 acres in size.

Typically, the surface layer is dark brown, very friable cobbly very fine sandy loam about 4 inches thick. The subsurface layer is dark yellowish brown, very friable cobbly very fine sandy loam about 6 inches thick. The subsoil is yellowish red and red, firm clay about 34 inches thick. The substratum is yellowish red, firm channery sandy clay loam. It is underlain by hard sandstone bedrock at a depth of about 49 inches.

Included with this soil in mapping are small areas of Lily and Ramsey soils, areas of Rock outcrop, areas of sandy soils that are cobbly throughout, and scattered areas of Beemont soils that do not have stones. Lily soils are 20 to 40 inches deep to bedrock, and Ramsey soils are 7 to 20 inches deep to bedrock. Both of these soils are on the top of monadnocks. The very cobbly sandy soils are in landscape positions similar to those of the Beemont soil. Included areas make up about 10 percent of the map unit.

Permeability is very slow in the Beemont soil. Surface runoff is medium. Available water capacity is low. Organic matter content is moderately low, and natural fertility is low. A perched water table is at a depth of 4 to 6 feet during most fall and winter months. The shrink-swell potential is high. The response to soil amendments is poor.

Most areas are wooded. Some small areas are used for pasture. This soil is not suited to cultivated crops because of the slope, the stones, and a low available water capacity.

This soil is poorly suited to pasture. The slope, the stones, and a low available water capacity are management concerns. The soil is moderately suited to some cool-season grasses, such as tall fescue, and to legumes, such as lespedeza and ladino clover.

This soil is poorly suited to ponds and lakes because of the slope and the depth to bedrock. The sites that are selected should be in areas where there is sufficient clay above the bedrock to prevent seepage and where the slope can be modified.

This soil is suited to trees. The equipment limitation and the seedling mortality rate are management concerns. Stones hinder the use of planting equipment. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

This soil is suited to building site development and to some onsite waste disposal systems. The high shrink-swell potential and the slope are limitations on sites for dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel help to prevent the structural damage caused by shrinking and swelling. Building sites can be leveled, or the dwellings designed so that they conform to the natural slope. The soil is not suited to septic tank absorption fields because of the slope and restricted permeability. Sewage lagoons function adequately if the site has been leveled; however, suitable sites generally are nearby and should be considered.

Low strength, the shrink-swell potential, the potential for frost action, and the slope are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or some other suitable base material minimizes the damage caused by low strength. Grading the roads so they shed water, constructing adequate roadside ditches, and installing culverts minimize the damage caused by shrinking and swelling and by frost action. Some land shaping may be necessary because of the slope.

The land capability classification is VIIe. The woodland ordination symbol is 2X.

28C—Beemont loam, 3 to 9 percent slopes. This deep, gently sloping and moderately sloping, moderately well drained soil is on toe slopes of monadnocks in the uplands. Individual areas are oval and range from 5 to more than 20 acres in size.

Typically, the surface layer is dark grayish brown and brown, very friable loam about 3 inches thick. The subsoil is about 39 inches thick. It is yellowish brown and dark grayish brown, very friable loam in the upper part; yellowish brown, friable clay in the next part; and yellowish brown and brown, firm clay in the lower part. Hard sandstone bedrock is at a depth of about 45 inches.

Included with this soil in mapping are small areas of Yelton, Lily, and Branson soils. Yelton soils have a fragipan. Branson soils are more than 60 inches deep to bedrock. Yelton and Branson soils are on uplands or old, high stream terraces. Lily soils are 20 to 40 inches deep to bedrock and are on plateaus of monadnocks. Included soils make up about 10 percent of the map unit.

Permeability is very slow in the Beemont soil. Surface runoff is medium. Available water capacity is moderate. Organic matter content is moderately low, and natural fertility is low. A perched water table is at a depth of 4 to 6 feet in most winter and spring months. The shrink-swell potential is high. The surface layer is very friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is fair.

Most areas are used for pasture or hay. A few small areas support native hardwoods. This soil is suited to small grain and grain sorghum. The hazard of erosion and the seasonal wetness are management concerns. An insufficient supply of moisture commonly is a limitation affecting crops grown during the summer. Contour farming and a combination of terraces and grassed waterways or tile outlets help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass and to red clover for hay. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. The depth to bedrock and the slope are limitations. The sites that are selected should be in areas where there are sufficient fines above the bedrock to prevent seepage and where the slope can be modified.

This soil is suited to trees. The seedling mortality rate and the hazard of windthrow are management concerns. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely.

This soil is suited to building site development and to most onsite waste disposal systems. The high shrink-swell potential is a limitation on sites for dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel help to prevent the structural damage caused by shrinking and swelling. Septic tank absorption fields will not function adequately because of restricted permeability. Sewage lagoons function adequately if the site is leveled and the bottom and berms of the lagoon are sealed with slowly permeable material, which helps to prevent seepage and the contamination of ground water. Community sewers should be used if they are available.

Low strength, the shrink-swell potential, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or some other suitable base material minimizes the damage caused by low strength. Grading the roads so they shed water, constructing adequate roadside ditches, and installing culverts minimize the damage caused by shrinking and swelling and by frost action.

The land capability classification is IVe. The woodland ordination symbol is 2C.

29C—Portia fine sandy loam, 3 to 9 percent slopes. This very deep, moderately sloping, well drained soil is on stream terraces and foot slopes. Individual areas are irregular in shape and range from 5 to more than 80 acres in size.

Typically, the surface layer is dark brown, very friable fine sandy loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown and yellowish red, friable loam in the upper part; red, friable and firm clay loam in the next part; and dark red, firm sandy clay loam in the lower part.

Included with this soil in mapping are small areas of Britwater soils. Britwater soils have less sand and more gravel than the Portia soil and are in similar landscape positions. They make up about 5 percent of the map unit.

Permeability is moderate in the Portia soil. Surface runoff is medium. Available water capacity is moderate. Organic matter content is moderate, and natural fertility is medium. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is fair.

Most areas are used for pasture or hay. A few small areas support native hardwoods. This soil is suited to small grain and grain sorghum. Erosion is a hazard. It restricts the choice of crops unless conservation practices are applied. A combination of terraces and grassed waterways or tile outlets help to control erosion in areas that have a high percentage of intensively cultivated row crops. A conservation cropping system that includes pasture or hay crops in the rotation, contour farming, and a system of conservation tillage that leaves a protective cover of crop residue on the surface also help to control erosion. Crop residue management helps to maintain the content of organic matter, improves tilth, and increases the rate of water infiltration.

This soil is suited to such commonly grown legumes as alfalfa and red clover, to such warm-season grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. Erosion is a hazard in newly seeded areas. Timely seedbed preparation helps to ensure a good ground cover.

This soil is moderately suited to ponds and lakes. The hazard of seepage and the slope are management concerns. Embankments for farm ponds and lakes are difficult to pack and seal. Chemical additives or a blanket of suitable soil material can reduce the seepage rate.

This soil is suited to trees. No management concerns affect planting or harvesting.

This soil is well suited to building site development and to most onsite waste disposal systems. Septic tank absorption fields function adequately if they are properly constructed. Seepage is a hazard on sites for sewage lagoons. Sealing the berms and bottom of the lagoon with slowly permeable material helps to reduce the seepage rate and the contamination of ground water. Community sewers should be used if they are available. There are no major limitations on sites for dwellings. Constructing footings and foundations with adequately reinforced concrete and backfilling with sand or gravel, however, minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings helps to prevent the damage to buildings caused by the wetness.

This soil is well suited to local roads and streets. No major limitations affect construction or use.

The land capability classification is IIIe. The woodland ordination symbol is 3A.

30C—Keeno very gravelly silt loam, 3 to 9 percent slopes. This very deep, gently sloping and moderately sloping, moderately well drained soil is on side slopes, mounds, and sharp breaks in the uplands. Individual areas are irregular in shape and range from about 5 to more than 100 acres in size.

Typically, the surface layer is very dark grayish brown and dark brown, very friable very gravelly silt loam about 10 inches thick. The upper part of the subsoil is about 13 inches thick. It is dark brown, friable very gravelly silty clay loam, and strong brown, dark yellowish brown, and pale brown, friable extremely gravelly silty clay loam. The next part is a fragipan of mottled, firm and brittle extremely gravelly silty clay loam about 8 inches thick. The lower part to a depth of 60 inches or more is dark red, firm very gravelly clay. In some places less gravel is above the fragipan. In other places the surface layer is brown.

Included with this soil in mapping are small areas of a soil that does not have a fragipan. The included soil is on the top of ridges and on the lower part of steep breaks. It makes up about 5 percent of the map unit.

Permeability is moderate above the fragipan in the Keeno soil, slow in the fragipan, and moderately rapid below the fragipan. Surface runoff is medium. Available water capacity is low. Organic matter content is moderate, and natural fertility is medium. The response to soil amendments is good. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 23 inches.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. This soil is suited to small grain and grain sorghum. The hazard of erosion, the high content of gravel in the surface layer, and a low available water capacity are management concerns. An insufficient supply of moisture commonly is a limitation affecting crops grown during the summer. Contour farming and a combination of terraces and grassed waterways or tile outlets help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. The gravel can hinder tillage and haying. Using a heavy roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. On sites that require excavations to a depth of 4 feet or more, seepage is a hazard. It generally can be controlled by keeping the excavation shallow or by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

This soil is suited to building site development and to some onsite waste disposal systems. The wetness is a limitation on sites for dwellings. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping can improve surface drainage and thus minimize the wetness on sites for dwellings with basements. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom of the lagoons should not be below the bottom of the fragipan.

Low strength, the wetness, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by wetness and frost action.

The land capability classification is IVs. No woodland ordination symbol is assigned.

31C—Waben very gravelly silt loam, 3 to 9 percent slopes. This very deep, gently sloping and moderately sloping, well drained soil is on high stream terraces, alluvial fans, and toe slopes. Individual areas are narrow and elongated and range from about 5 to more than 60 acres in size.

Typically, the surface layer is dark brown, very friable very gravelly silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. It is dark grayish brown and strong brown, friable gravelly and very gravelly silty clay loam in the upper part; dark red, brown, and yellowish red, friable extremely gravelly silty clay loam in the next part; and brown and strong brown, firm extremely gravelly silty clay loam in the lower part. In some places less gravel is in the surface layer and upper part of the subsoil. In other places the slope is steeper.

Included with this soil in mapping are small areas of Noark soils. Noark soils have more clay in the upper part of the subsoil than the Waben soil. They are on the steep breaks and in landscape positions higher than those of the Waben soil. Included soils make up about 10 percent of the map unit.

Permeability is moderately rapid in the Waben soil. Surface runoff is medium. Available water capacity is moderate. The organic matter content is moderately low, and natural fertility is medium. The response to soil amendments is fair.

Most areas are used for pasture or hay. A few small areas are used for cultivated crops. Some isolated areas support native hardwoods. This soil is moderately suited to small grain and grain sorghum. Erosion is a hazard. Because of extensive cultivation in the past, some areas are severely eroded. A conservation cropping system that includes pasture or hay crops in the rotation, contour farming, and a system of conservation tillage that leaves a protective cover of crop residue on the surface help to control erosion. Crop residue management helps to maintain the content of organic matter, improves tilth, and increases the rate of water infiltration.

This soil is suited to grasses and legumes for pasture or hay. The slope, the high content of gravel, and erosion are management concerns. A system of conservation tillage helps to control excessive erosion. The gravel can hinder tillage and haying. Using a heavy roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

Because ponds in areas of this soil have a high

seepage rate, the amount of available livestock water may be limited. Embankments for farm ponds and lakes are difficult to pack and seal. Chemical additives or a blanket of suitable soil material can reduce the seepage rate. In some areas deep wells provide livestock water.

This soil is suited to trees. The seedling mortality rate is the main limitation affecting planting or harvesting. Reinforcement planting or selection of container-grown stock increases the seedling survival rate.

This soil is well suited to building site development and to some onsite waste disposal systems. There are no major limitations on sites for dwellings. Constructing footings and foundations with adequately reinforced concrete and backfilling with sand or gravel, however, can minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings helps to prevent the wetness that can be caused by the poor drainage. Seepage is a hazard on sites for sewage lagoons. Sealing the bottom and berms of the lagoon helps to prevent seepage and the contamination of ground water. Septic tank absorption fields function adequately if properly constructed.

This soil is well suited to local roads and streets. There are no major limitations.

The land capability classification is IIIs. The woodland ordination symbol is 3F.

35D—Hailey-Nixa very gravelly silt loams, 5 to 14 percent slopes. These very deep, moderately sloping and strongly sloping, excessively drained and moderately well drained soils are on the narrow ridges of deeply dissected plateaus in the uplands. The Nixa soil commonly is on the upper part of the landscape. The unit is about 60 percent Hailey soil and 30 percent Nixa soil. The two soils could not be mapped separately at the scale selected for mapping. Individual areas are narrow and elongated and range from 5 to more than 100 acres in size.

Typically, the surface layer of the Hailey soil is dark grayish brown, very friable very gravelly silt loam about 6 inches thick. The subsurface layer is pale brown and light brownish gray, very friable extremely gravelly silt loam about 28 inches thick. The subsoil to a depth of 60 inches or more is brownish yellow and yellowish brown, friable extremely gravelly silt loam. In places stones are on the surface.

Typically, the surface layer of the Nixa soil is very dark grayish brown, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is brown, very friable very gravelly silt loam about 9 inches thick. The subsoil above the fragipan is yellowish brown, very friable extremely gravelly silt loam about 12 inches thick. The next layer is a fragipan of mottled, firm and brittle extremely gravelly silt loam about 13 inches thick. The subsoil below the fragipan to a depth of 60 inches or more is brown, firm extremely gravelly silt loam.

Included with these soils in mapping are small areas of Clarksville soils. Clarksville soils have more clay in the lower part of the subsoil than the Nixa and Halley soils and are in similar landscape positions. They make up about 10 percent of the map unit.

Permeability is rapid in the Hailey soil. It is moderate above and below the fragipan in the Nixa soil and very slow in the fragipan. Surface runoff is medium on both soils. Available water capacity is low in the Hailey soil and very low in the Nixa soil. Organic matter content and natural fertility are low in both soils. A perched water table is above the fragipan during most winter and spring months. The rooting depth in the Nixa soil is restricted by the fragipan at a depth of about 27 inches. The response to soil amendments is fair.

Most areas are wooded. Some areas are used for pasture or hay. These soils are not suited to cultivated crops because of the high content of gravel, the hazard of erosion, and the droughtiness.

These soils are moderately suited to such legumes as lespedeza, alfalfa, red clover, and hop clover in grass mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as bermudagrass and switchgrass. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible. The high content of gravel on the surface is a management concern and can hinder haying. Using a heavy roller in the spring to press the chert into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years.

These soils generally are not suitable as a site for ponds or lakes because of a high seepage rate and the high content of gravel.

These soils are suited to trees. The hazard of windthrow is a management concern in areas of the Nixa soil. The stands should be thinned less intensively and more frequently than those in areas where windthrow is less likely. The seedling mortality rate is a management concern in areas of both soils. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

The Hailey soil is not suited to onsite waste disposal systems because of the rapid permeability and the high content of gravel. Alternative sites or systems should be considered. The Nixa soil is suited to building site development and to some onsite waste disposal systems. The wetness can be a limitation on sites for

dwellings. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. The seasonal wetness and the restricted permeability in areas of the Nixa soil are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field.

The wetness and the potential for frost action are limitations on sites for local roads and streets in areas of the Nixa soil. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by wetness and frost action.

The land capability classification is VIe. The woodland ordination symbol is 3F for the Hailey soil and 3D for the Nixa soil.

36D—Nixa-Clarksville very gravelly silt loams, 5 to 14 percent slopes. These very deep, moderately sloping and strongly sloping, moderately well drained and somewhat excessively drained soils are on narrow ridges of deeply dissected plateaus. The Nixa soil commonly is on the upper part of the landscape. The Clarksville soil is on the steeper side slopes. The unit is about 55 percent Nixa soil and 35 percent Clarksville soil. The two soils could not be mapped separately at the scale selected for mapping. Individual areas are narrow and elongated and range from 5 to more than 100 acres in size.

Typically, the surface layer of the Nixa soil is dark grayish brown, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is pale brown, very friable very gravelly silt loam about 6 inches thick. The upper part of the subsoil is yellowish brown, very friable very gravelly silt loam about 11 inches thick. The next layer is a fragipan of mottled, firm and brittle extremely gravelly silt loam and extremely gravelly silty clay loam about 16 inches thick. The lower part extends to a depth of 60 inches or more. It is dark red, firm extremely gravelly silty clay in the upper part and dark red, mottled, firm extremely gravelly clay in the lower part. In places the upper part of the subsoil has more clay.

Typically, the surface layer of the Clarksville soil is brown, very friable very gravelly silt loam about 6 inches thick. The subsurface layer is brown and pale brown, very friable very gravelly silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish brown and strong brown, friable very gravelly silty clay loam in the upper part; strong brown, firm very gravelly silty clay in the next part; and dark red, firm gravelly clay in the lower part. In some places stones are on the surface. In other places the upper part of the subsoil has more clay

Included with these soils in mapping are small areas of Hailey soils. Hailey soils have less clay in the lower part of the subsoil than the Nixa and Clarksville soils and are in similar landscape positions. They make up about 10 percent of the map unit.

Permeability is moderate above and below the fragipan in the Nixa soil and very slow in the fragipan. It is moderately rapid in the upper part of the Clarksville soil and moderate in the lower part. Surface runoff is medium on the Nixa soil and moderately rapid on the Clarksville soil. Available water capacity is low in the Clarksville soil and very low in the Nixa soil. Organic matter content and natural fertility are low in both soils. A perched water table is above the fragipan in the Nixa soil during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 25 inches. The response of both soils to soil amendments is fair.

Most areas are wooded. Some areas are used for pasture or hay (fig. 8). These soils are not suited to cultivated crops because of the high content of gravel, the hazard of erosion, and the droughtiness.

These soils are moderately suited to such legumes as lespedeza, alfalfa, red clover, and hop clover in grass mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as bermudagrass and switchgrass. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible. The high content of gravel on the surface can hinder haying. Using a heavy roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years.

These soils generally are not suitable as a site for ponds or lakes because of a high seepage rate and the high content of gravel. Seepage in areas of the Nixa soil can be controlled by keeping the excavation shallow or by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

These soils are suited to trees. The hazard of windthrow is a management concern in areas of the Nixa soil. The stands should be thinned less intensively and more frequently than those in areas where windthrow is less likely. The seedling mortality rate is a management concern in areas of both soils.

Figure 8.—Tall fescue pasture in an area of Nixa-Clarksville very gravelly silt loams, 5 to 14 percent slopes.

Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils are suited to building site development and to some onsite waste disposal systems. The stones can be a limitation on sites for dwellings. Constructing footings and foundations with adequately reinforced concrete and backfilling with sand or gravel help to prevent structural damage caused by shrinking and swelling. Installing tile drains around footings helps to prevent the wetness in basements caused by the poor drainage. The seasonal wetness and the restricted permeability in areas of the Nixa soil are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. The Clarksville soil is suited to septic tank absorption fields; however, the slope is a limitation. These fields should be constructed across the slope. The Clarksville and Nixa soils are not suited to sewage lagoons because of the slope and seepage.

The potential for frost action is a limitation on sites for local roads and streets. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts to remove excess water can minimize

the damage caused by frost action.

The land capability classification is VIe. The woodland ordination symbol is 3F for the Clarksville soil and 3D for the Nixa soil.

40D—Noark-Clarksville very gravelly silt loams, 5 to 14 percent slopes. These very deep, moderately sloping and strongly sloping, well drained and somewhat excessively drained soils are on narrow ridges of deeply dissected plateaus. The Noark soil is in the higher landscape positions. The unit is about 65 percent Noark soil and 30 percent Clarksville soil. The two soils could not be mapped separately at the scale selected for mapping. Individual areas are narrow and elongated and range from 10 to more than 200 acres in size.

Typically, the surface layer of the Noark soil is dark grayish brown, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is pale brown, very friable very gravelly silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown and pale brown, very friable very gravelly silt loam in the upper part; yellowish red, friable very gravelly clay in the next part; and dark red, firm extremely gravelly clay in the lower part. In places the subsoil has less gravel.

Typically, the surface layer of the Clarksville soil is dark grayish brown, very friable very gravelly silt loam about 5 inches thick. The subsurface layer is brown, very friable very gravelly silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown and brown, very friable extremely gravelly silt loam in the upper part; strong brown, friable extremely gravelly silty clay loam in the next part; and dark red and red, firm extremely gravelly clay in the lower part.

Included with these soils in mapping are small areas of Nixa soils. Nixa soils have a fragipan and are on the wider ridges. They make up about 5 percent of the map unit.

Permeability is moderate in the Noark soil. It is moderately rapid in the upper part of the Clarksville soil and moderate in the lower part. Surface runoff is medium on the Noark soil and moderately rapid on the Clarksville soil. Available water capacity is low in both soils. Organic matter content and natural fertility are also low. The response to soil amendments is fair.

Most areas are wooded. Some areas are used for pasture or hay. These soils are not suited to cultivated crops because of erosion, the high content of gravel, and a low available water capacity.

These soils are moderately suited to such legumes as lespedeza, alfalfa, red clover, and hop clover in grass mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as bermudagrass and switchgrass. They are moderately suited to alfalfa and red clover for hay. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible. The high content of gravel can hinder haying. Using a roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years.

These soils are moderately suited to ponds and lakes. Seepage and the slope are hazards. Embankments for farm ponds and lakes are difficult to pack and seal. Chemical additives or a blanket of suitable soil material can reduce the seepage rate. The slope can be modified to increase the volume of the ponds and lakes.

These soils are well suited to trees. The equipment limitation and the seedling mortality rate are management concerns. Hand planting may be necessary because of the high content of gravel. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils are suited to building site development and to most onsite waste disposal systems. The slope is a limitation on sites for dwellings. The sites can be leveled or the dwellings designed to conform to the natural slope. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel minimize the structural damage caused by shrinking and swelling. Septic tank absorption fields can function adequately if they are properly constructed across the slope and if the size of the lateral area is increased. These soils are not suited to sewage lagoons because of seepage and the slope. Community sewers should be used if they are available.

The slope and the potential for frost action are limitations on sites for local roads and streets. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by frost action. Designing the roads on the contour or some cutting and filling may be needed.

The land capability classification is VIe. The woodland ordination symbol is 3F.

41E—Noark very gravelly silt loam, 9 to 20 percent slopes. This very deep, strongly sloping to moderately steep, well drained soil is on side slopes in the uplands. Individual areas are narrow and elongated and range from 5 to 40 acres in size.

Typically, the surface layer of the Noark soil is dark

brown, very friable very gravelly silt loam about 4 inches thick. The subsurface layer is very dark brown, very friable very gravelly silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is pale brown, friable very gravelly silty clay loam in the upper part; yellowish red, firm very gravelly silty clay in the next part; and dark red, firm very gravelly clay in the lower part. In some places the upper part of the subsoil has less clay. In other places stones are on the surface. In some areas the slope is more than 20 percent.

Included with this soil in mapping are small areas of Nixa and Scholten soils and areas of Rock outcrop. Nixa and Scholten soils have a fragipan and are on shoulder slopes. The areas of Rock outcrop occur near the base of the steeper slopes. Included areas make up about 5 percent of the map unit.

Permeability is moderate in the Noark soil. Surface runoff is rapid. Available water capacity is low. Organic matter content and natural fertility also are low. The response to soil amendments is fair.

Most areas are used for pasture. Some areas support native hardwoods. This soil is not suited to cultivated crops because of erosion, the high content of gravel, and a low available water capacity.

This soil is moderately suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as bermudagrass and switchgrass. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil generally is not suitable as a site for ponds and lakes because of a high seepage rate and the slope.

This soil is suited to trees. The equipment limitation and the seedling mortality rate are management concerns. Constructing water bars and locating logging roads and skid trails on the contour help to control erosion. Reinforcement planting or selection of container-grown stock increases the seedling survival rate.

This soil generally is not used for building site development and onsite waste disposal systems because of the slope. Alternative sites or systems should be considered.

The land capability classification is VIe. The woodland ordination symbol is 3F.

44G—Hailey-Rock outcrop-Moko complex, 35 to 60 percent slopes. This map unit occurs as areas of very deep and very shallow, very steep, excessively drained and well drained soils and areas of Rock outcrop. The unit is on side slopes of deeply dissected plateaus in the uplands. The areas of Rock outcrop are intermingled with the Moko soil on the nose slopes and lower slopes and with the Hailey soil on the upper side slopes. The unit is about 60 percent Hailey soil, 20 percent Rock outcrop, and 15 percent Moko soil. These components could not be mapped separately at the scale selected for mapping. Stones cover 3 to 10 percent of the surface in areas of the Moko soil. Individual areas are narrow and elongated and range from 100 to more than 300 acres in size.

Typically, the surface layer of the Hailey soil is very dark grayish brown, very friable extremely gravelly silt loam about 4 inches thick. The subsurface layer is dark brown, very friable extremely gravelly silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown and yellowish brown, very friable very gravelly silt loam. The lower part is yellowish brown and light yellowish brown, very friable extremely gravelly silt loam. In places the slope is less than 35 percent.

Typically, the surface layer of the Moko soil is very dark gray, very friable very flaggy silt loam about 3 inches thick. The subsurface layer is very dark gray, very friable very flaggy silty clay loam. Hard limestone bedrock is at a depth of about 10 inches. In some places the soil has more clay throughout. In other places the slope is less than 35 percent.

Included with this unit in mapping are small areas of Bardley and Clarksville soils. Bardley soils are 20 to 40 inches deep to bedrock and are on the lower side slopes. Clarksville soils have more clay in the lower part of the subsoil than the Hailey soil and are in similar landscape positions. Included soils make up about 5 percent of the map unit.

Permeability is rapid in the Hailey soil and moderate in the Moko soil. Surface runoff is rapid on both soils. Available water capacity is low in the Hailey soil and very low in the Moko soil. Organic matter content is low in the Hailey soil and moderate in the Moko soil. Natural fertility is low in the Hailey soil and medium in the Moko soil.

Most areas are wooded. A few areas are used for pasture. This unit is not suited to cultivated crops, hay, or pasture because of the slope, the Rock outcrop, and a low or very low available water capacity.

This unit is not suitable as a site for ponds or lakes because of the restricted permeability and the slope in areas of the Clarksville soil and because of the areas of Rock outcrop.

This unit is best suited to trees. The hazard of erosion, the equipment limitation, and the seedling mortality rate are the major management concerns in

areas of the Moko and Hailey soils. The hazard of windthrow also is a management concern in areas of the Moko soil. Constructing water bars and locating logging roads and skid trails on the contour help to prevent erosion. Yarding logs uphill to skid trails may be necessary. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate. Because of low production, the Moko soil is generally not suitable for intensive woodland management.

This unit generally is not suited to building site development and onsite waste disposal systems because of the slope, the Rock outcrop, and the stones.

The land capability classification is VIIe. The woodland ordination symbol is 3R for the Hailey soil and 2R for the Moko soil. No woodland ordination symbol is assigned to the Rock outcrop.

45F—Clarksville very gravelly silt loam, 14 to 35 percent slopes. This very deep, moderately steep to very steep, somewhat excessively drained soil is on the side slopes and toe slopes of deeply dissected plateaus in the uplands. Individual areas are narrow and elongated and range from 80 to more than 500 acres in size.

Typically, the surface layer is brown, very friable very gravelly silt loam about 1 inch thick. The subsurface layer is pale brown and very pale brown, very friable very gravelly silt loam about 15 inches thick. The subsoil extends to a depth of 60 inches or more. It is light brown and reddish yellow, very friable extremely gravelly silt loam in the upper part; brown, reddish yellow, and strong brown, friable extremely gravely silty clay loam in the next part; and yellowish brown and red, firm extremely gravelly clay in the lower part. In places stones are on the surface.

Included with this soil in mapping are small areas of Cedargap, Hailey, and Nixa soils and areas of Rock outcrop. Cedargap soils are on flood plains. They have a surface layer that is darker and thicker than that of the Clarksville soil. Hailey soils have less clay in the subsoil than the Clarksville soil and are in similar landscape positions. Nixa soils are on knobs and ridgetops. They have a fragipan. The areas of Rock outcrop commonly are adjacent to narrow flood plains. Included areas make up about 10 percent of the map unit.

Permeability is moderately rapid in the upper part of the Clarksville soil and moderate in the lower part. Surface runoff is medium or rapid. Available water capacity is low. Organic matter content and natural fertility also are low. The response to soil amendments is fair.

Most areas are wooded. Some areas are used for pasture. This soil is not suited to cultivated crops because of the slope, the hazard of erosion, and a low available water capacity.

This soil is moderately suited to grasses and legumes for pasture. Suitable pasture plants are tall fescue, lespedeza, and hop clover. Proper stocking rates and timely deferment of grazing help to keep pastures in good condition. Conventional seeding is impractical because of the slope. Hand seeding or aerial seeding should be considered.

This soil is suited to trees. The hazard of erosion, the equipment limitation, and the seedling mortality rate are the major management concerns. Constructing water bars and locating logging roads and skid trails on the contour help to prevent erosion. Reseeding disturbed areas prevents excessive erosion. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

This soil generally is not suited to building site development and onsite waste disposal systems because of the slope, a high seepage rate, and the extremely gravelly texture.

The land capability classification is VIIe. The woodland ordination symbol is 3R.

46G—Clarksville-Rock outcrop-Moko complex, 35 to 60 percent slopes. This map unit occurs as areas of very deep and shallow, very steep, somewhat excessively drained and well drained soils and areas of Rock outcrop. The unit is on side slopes of deeply dissected plateaus in the uplands. The Clarksville soil commonly is on the upper part of the landscape. The areas of Rock outcrop are intermingled throughout areas of the Clarksville and Moko soils. The unit is about 50 percent Clarksville soil, 25 percent Rock outcrop, and 20 percent Moko soil. These components could not be mapped separately at the scale selected for mapping. Stones cover 3 to 10 percent of the surface in areas of the Moko soil. Individual areas are narrow and elongated and range from 100 to more than 300 acres in size.

Typically, the surface layer of the Clarksville soil is very dark grayish brown, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is pale brown, very friable very gravelly silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown and pale brown, very friable very gravelly silt loam in the upper part; yellowish red, reddish yellow, and red, firm very gravelly silty clay loam in the next part; and dark red, firm extremely gravelly clay in the lower part. In some places the upper part of the subsoil has more clay. In other places the slope is less than 35 percent.

Typically, the surface layer of the Moko soil is black,

very friable flaggy silty clay loam about 8 inches thick. The subsoil is black, very friable very flaggy silty clay loam. Hard dolomite bedrock is at a depth of about 16 inches. In places the subsoil has less clay.

Included with this unit in mapping are small areas of Cedargap and Hailey soils. Cedargap soils have a thick, dark surface layer. They are on narrow flood plains. Hailey soils have less clay in the subsoil than the Clarksville soil and are in similar landscape positions. Included soils make up about 5 percent of the map unit.

Permeability is moderately rapid in the upper part of the Clarksville soil and moderate in the lower part. It is moderate in the Moko soil. Surface runoff is rapid on the Moko soil and moderately rapid on the Clarksville soil. Available water capacity is low in the Clarksville soil and very low in the Moko soil. Organic matter content is low in the Clarksville soil and moderate in the Moko soil. Natural fertility is low in the Clarksville soil and medium in the Moko soil. The shrink-swell potential is moderate in the Moko soil.

Most areas are wooded. A few areas are used for pasture. This unit is not suited to cultivated crops or pasture because of the slope, the Rock outcrop, and a low or very low available water capacity. It is not suitable as a site for ponds or lakes because of the Rock outcrop, the slope in areas of the Moko and Clarksville soils, the depth to bedrock in areas of the Moko soil, and the permeability in areas of the Clarksville soil.

The Clarksville soil is suited to trees. The Moko soil is best suited to trees, but production is low and generally is not sufficient for commercial timber management. The hazard of erosion, the equipment limitation, and the seedling mortality rate are the major management concerns in areas of both soils. The hazard of windthrow also is a management concern in areas of the Moko soil. Constructing water bars and locating logging roads and skid trails on the contour help to prevent erosion. Reseeding disturbed areas prevents excessive erosion. Yarding logs uphill to skid trails may be necessary. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate. The stands should be thinned less intensively and more frequently in areas of the Moko soil than in those areas where windthrow is less likely.

This unit generally is not suited to building site development and onsite waste disposal systems because of the slope, the Rock outcrop, and the stones.

The land capability classification is VIIe. The woodland ordination symbol is 3R for the Clarksville soil and 2R for the Moko soil. No woodland ordination symbol is assigned to the Rock outcrop.

50C—Nixa very gravelly silt loam, 3 to 9 percent slopes. This very deep, gently sloping and moderately sloping, moderately well drained soil is on ridgetops and side slopes in the uplands. Individual areas are broad and oval with fingerlike ridges. They range from 10 to more than 300 acres in size.

Typically, the surface layer is very dark grayish brown, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is dark grayish brown, very friable very gravelly silt loam about 7 inches thick. The upper part of the subsoil is yellowish brown, friable very gravelly silt loam and pale brown, very friable extremely gravelly silt loam about 14 inches thick. The next part is a fragipan of mottled, firm and brittle extremely gravelly and very gravelly silty clay loam about 15 inches thick. The lower part extends to a depth of 60 inches or more. It is red, mottled, firm very gravelly clay in the upper part and dark reddish brown, firm very gravelly clay in the lower part. In places the soil has more clay above the fragipan.

Included with this soil in mapping are small areas of Clarksville, Noark, and Tonti soils. Clarksville soils do not have a fragipan and are on the lower, long, steep side slopes. Noark soils do not have a fragipan and are on moderately steep breaks near streams. Tonti soils commonly are on the wider ridgetops. They have less gravel above the fragipan than the Nixa soil. Included soils make up about 10 percent of the map unit.

Permeability is moderate above and below the fragipan in the Nixa soil and very slow in the fragipan. Surface runoff is medium. Available water capacity is low. Organic matter content and natural fertility also are low. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 24 inches. The response to soil amendments is fair.

Most areas are used for pasture or hay. Some areas support native hardwoods. A few small areas are used for cultivated crops. This soil is moderately suited to small grain and grain sorghum. The hazard of erosion, a low content of organic matter, poor tilth, and the high content of gravel in the surface layer are management concerns. An insufficient supply of moisture commonly is a limitation affecting crops grown during the summer. A combination of terraces and grassed waterways or tile outlets and contour farming help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is suited to such legumes as lespedeza and

hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible. The gravel fragments on the surface can hinder haying. Using a heavy roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years.

This soil is moderately suitable as a site for ponds and lakes. On sites that require excavations to a depth of 4 feet or more, seepage is a hazard. It generally can be controlled by keeping the excavation shallow and by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

This soil is moderately suited to trees. The seedling mortality rate and the hazard of windthrow are management concerns. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely.

This soil is suited to building site development and to some onsite waste disposal systems. The stones are a limitation on sites for dwellings. Obtaining better backfill material from other nearby areas of soil can help to overcome this limitation. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping and shallow drainage ditches can improve surface drainage and thus reduce the wetness on sites for dwellings with basements. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom and berms of the lagoons should be sealed with slowly permeable material if they are constructed below the fragipan.

Low strength, the wetness, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or other suitable base material minimizes the damage caused by low strength. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by wetness and frost action.

The land capability classification is IVs. The woodland ordination symbol is 3D.

51B—Tonti-Scholten complex, 2 to 6 percent slopes. These very deep, gently sloping, moderately well drained soils are on broad ridges in the uplands. The Tonti soil is on ridgetops. The Scholten soil is in lower positions on the side slopes. The unit is about 60 percent Tonti soil and 30 percent Scholten soil. These soils could not be mapped separately at the scale selected for mapping. Individual areas are irregular in shape and range from 5 to more than 500 acres in size.

Typically, the surface layer of the Tonti soil is dark grayish brown, very friable silt loam about 7 inches thick. The upper part of the subsoil to a depth of 25 inches is yellowish brown, friable silt loam and strong brown, friable and firm gravelly silty clay. The next part is a fragipan of mottled, very firm and brittle very gravelly silty clay loam. The lower part to a depth of 60 inches or more is dark red, very firm very gravelly clay. In places less than 15 percent chert is in the upper subsoil. In eroded areas the surface layer is less than 5 inches thick in places.

Typically, the surface layer of the Scholten soil is dark brown, very friable gravelly silt loam about 3 inches thick. The subsurface layer is brown, very friable gravelly silt loam about 4 inches thick. The upper part of the subsoil is yellowish brown, very friable gravelly silt loam and strong brown, friable very gravelly silty clay loam. The next part is a fragipan of mottled, firm and brittle extremely gravelly silty clay loam. The lower part to a depth of 60 inches or more is red, firm extremely gravelly clay. In places the upper subsoil has less clay.

Included with this soil in mapping are small areas of Noark soils. Noark soils do not have a fragipan. They are on steep breaks and in other landscape positions similar to those of the Scholten soil. They make up about 10 percent of the map unit.

Permeability is moderate above and below the fragipan in the Tonti soil and slow in the fragipan. It is moderate above the fragipan in the Scholten soil, very slow in the fragipan, and moderately rapid below the fragipan. Surface runoff is medium on both soils. Available water capacity is moderate in the Tonti soil and low in the Scholten soil. Organic matter content is moderately low in both soils, and natural fertility is low. A perched water table is above the fragipan in both soils during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about

25 inches in the Tonti soil and at a depth of about 20 inches in the Scholten soil. The surface layer of the Tonti soil is very friable and can be easily tilled throughout a wide range in moisture content. It tends to puddle and crust if left fallow. The response to soil amendments is fair.

Most areas are used for pasture or hayland. Some areas are used for cultivated crops. A few small areas support native hardwoods. These soils are suited to small grain and grain sorghum. The hazard of erosion and the seasonal wetness are management concerns. An insufficient supply of moisture commonly is a limitation affecting cultivated crops grown during the summer. A combination of terraces and grassed waterways or tile outlets and contour farming help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

These soils are well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. They are moderately suited to bermudagrass and to alfalfa and red clover for hay. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

These soils are suitable as a site for ponds and lakes. On sites that require excavations to a depth of 4 feet or more, seepage is a hazard. It generally can be controlled by keeping the excavation shallow or by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

These soils are suited to trees. The hazard of windthrow is a management concern in areas of both soils. The seedling mortality rate is a management concern in areas of the Scholten soil. The stands should be thinned less intensively and more frequently than those in areas where windthrow is less likely. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils are suited to building site development and to some onsite waste disposal systems. The wetness is a limitation on sites for all dwellings, and the shrink-swell potential is a limitation on sites for dwellings with basements. Constructing footings and basement walls with adequately reinforced concrete and backfilling with sand or gravel in areas of the Scholten soil minimize the structural damage caused by shrinking and swelling. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Grading, land shaping, and establishing ditches can improve surface drainage in some areas. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom of the lagoons should not be below the bottom of the fragipan.

The shrink-swell potential, the wetness, and the potential for frost action are limitations on sites for local roads and streets. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by shrinking and swelling, by the wetness, and by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 4D for the Tonti soil and 2D for the Scholten soil.

54—Dunning silt loam, overwashed. This very deep, nearly level, poorly drained soil is in depressions and seepy areas on flood plains adjacent to the uplands. It is frequently flooded. Individual areas are oval and range from 5 to more than 30 acres in size.

Typically, the surface layer is very dark gray, mottled, very friable silt loam about 13 inches thick. The subsurface layer is black, friable silty clay loam about 5 inches thick. The subsoil is very dark gray, mottled, firm silty clay about 10 inches thick. The substratum to a depth of 60 inches or more is dark gray, mottled, friable silty clay.

Included with this soil in mapping are small areas of Elk, Huntington, and Racoon soils. Elk and Huntington soils are well drained and are on flood plains. Racoon soils have less clay than the Dunning soil. They are on the higher part of the flood plains. Included soils make up about 10 percent of the map unit.

Permeability is slow in the Dunning soil. Surface runoff also is slow. Available water capacity is high. Organic matter content is moderate, and natural fertility is medium. The shrink-swell potential is moderate. The seasonal high water table is within a depth of 0.5 foot during most winter and spring months. The response to soil amendments is good if surface drainage is adequate.

Most areas are used for pasture or hay. A few small areas are used for cultivated crops. This soil is suited to soybeans, small grain, and grain sorghum. The wetness and the flooding are the major management concerns. Land grading, constructing surface ditches, and installing tile drains improve drainage. Most of the flooding occurs during the winter and early spring months, but moderate crop damage can be expected during some years. Cover crops, crop residue management, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is suited to water-tolerant grasses and legumes for pasture and hay. Examples are tall fescue, reed canarygrass, alsike clover, and ladino clover. Grazing when the soil is wet causes compaction and poor tilth. The quality of the pasture, the condition of the soil, and forage yields can be improved by proper stocking rates, applications of fertilizer, pasture rotation, and timely deferment of grazing.

This soil is well suited to ponds and lakes.

This soil is moderately suited to water-tolerant trees. The equipment limitation, the seedling mortality rate, and the hazard of windthrow are the major concerns. Equipment should be operated only when the soil is dry or frozen. Ridging the soil and then planting on the ridges increase the seedling survival rate. Reinforcement planting or selection of container-grown nursery stock also increases the seedling survival rate. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely.

This soil is not suited to building site development or onsite waste disposal systems because of the frequent flooding and the seasonal high water table.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

55—Elk-Huntington silt loams. These very deep, nearly level, well drained soils are on low stream terraces and flood plains. The Huntington soil is adjacent to stream channels on the lower landscape positions. Flooding occurs occasionally in areas of the Elk soil. It occurs frequently but is of brief duration in areas of the Huntington soil. The unit is about 65 percent Elk soil and 25 percent Huntington soil. The two soils could not be mapped separately at the scale selected for mapping. Individual areas are elongated and range from 10 to more than 100 acres in size.

Typically, the surface layer of the Elk soil is dark brown, very friable silt loam about 9 inches thick. The subsurface layer is dark brown, friable silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. It is dark brown, friable silty clay loam in the upper part and strong brown, firm silty clay loam in the lower part.

Typically, the surface layer of the Huntington soil is very dark grayish brown, friable silt loam about 10 inches thick. The subsoil to a depth of about 40 inches is dark brown, friable silt loam. The substratum to a depth of 60 inches or more is dark brown, friable silt loam. In places the dark surface layer is more than 24 inches thick.

Included with these soils in mapping are small areas of Cedargap, Racoon, and Secesh soils. Cedargap soils have more gravel throughout than the Elk and Huntington soils. They are on narrow flood plains. Racoon soils are poorly drained and are on high flood plains. Secesh soils have more gravel in the subsoil than the Elk and Huntington soils. They are on low stream terraces. Included soils make up about 10 percent of the map unit.

Permeability is moderate in the Elk and Huntington soils. Surface runoff is medium. The available water capacity is high in both soils. Organic matter content is moderate in the Elk soil and high in the Huntington soil. Natural fertility is medium in both soils. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is very good.

Most areas are used for pasture or hay. Some large areas are used for cultivated crops. A few small isolated areas support native hardwoods. These soils are well suited to soybeans, small grain, and grain sorghum. Flooding and scouring are the major management concerns. The excessive runoff from the uplands also is a management concern. Diversion terraces can help protect these soils from this runoff. Stabilizing streambanks and maintaining a good ground cover help to reduce the damage caused by scouring and flooding. Crop residue management helps to maintain the content of organic matter, improves tilth, and increases the rate of water infiltration.

These soils are well suited to such commonly grown legumes as alfalfa and red clover, to such warm-season grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. Timely seedbed preparation helps to ensure a good ground cover and helps to prevent scouring.

These soils are suitable as a site for ponds and lakes. The hazard of seepage is moderate. A blanket of silty material or an expanding type of clay can reduce the seepage rate.

These soils are well suited to trees. No major management concerns affect planting or harvesting.

These soils are not suited to building site development or onsite sanitary waste disposal systems because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A.

61B—Hoberg silt loam, 2 to 5 percent slopes. This very deep, gently sloping, moderately well drained soil is on ridgetops and side slopes in the uplands and high stream terraces. Individual areas are oval and range from 5 to more than 100 acres in size.

Typically, the surface layer is very dark grayish brown, very friable silt loam about 8 inches thick. The upper part of the subsoil is strong brown, friable silty clay loam and dark brown, mottled, friable gravelly silty clay loam about 16 inches thick. The next part is a fragipan of mottled, firm and brittle extremely gravelly silty clay loam about 24 inches thick. The subsoil below the fragipan to a depth of 60 inches or more is red and reddish brown, mottled, very firm extremely gravelly silty clay. In some eroded areas the surface layer is dark brown silty clay loam. In places the subsoil above the fragipan has less gravel and more clay. In other places the soil is gravelly throughout.

Permeability is moderate above and below the fragipan in the Hoberg soil and slow in the fragipan. Surface runoff is medium. Available water capacity is low. Organic matter content is moderate, and natural fertility is medium. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 24 inches. The surface layer is friable and can be easily tilled throughout a fairly wide range in moisture content. It tends to crust or puddle if left fallow. The response to soil amendments is good.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. This soil is suited to small grain and grain sorghum. The hazard of erosion and the droughtiness are management concerns. A combination of terraces and grassed waterways or tile outlets and contour farming help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. On sites that require excavations to a depth of 4 feet or more, seepage is a hazard. It generally can be controlled by keeping the excavation shallow and by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

This soil is suited to building site development and to some onsite waste disposal systems. The wetness is a limitation on sites for dwellings. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping can improve surface drainage and thus minimize the wetness on sites for dwellings with basements. Constructing footings and foundations with adequately reinforced concrete and backfilling with sand or gravel help to prevent the structural damage caused by shrinking and swelling. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom of the lagoons should not be below the bottom of the fragipan.

The wetness and the potential for frost action are limitations on sites for local roads and streets. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by wetness and frost action.

The land capability classification is IIIe. No woodland ordination symbol was assigned.

76—Racoon silt loam. This very deep, nearly level, poorly drained soil is on flood plains. It is occasionally flooded and ponded. Individual areas are narrow and elongated and range from about 10 to more than 100 acres in size.

Typically, the surface layer is very dark grayish brown and dark grayish brown, very friable silt loam about 9 inches thick. The subsurface layer is about 21 inches thick. It is grayish brown, very friable silt loam in the upper part and light brownish gray, mottled, friable silt loam in the lower part. The subsoil to a depth of 60 inches or more is grayish brown and gray, mottled, firm silty clay loam.

Included with this soil in mapping are small areas of Elk, Dunning, Huntington, and Secesh soils. Elk and Secesh soils are well drained. They are in landscape positions similar to those of the Racoon soil. Dunning

soils are in depressions on flood plains. They have more clay throughout than the Racoon soil. Huntington soils are well drained and are on flood plains adjacent to stream channels. Included soils make up about 15 percent of the map unit.

Permeability is slow in the Racoon soil. Surface runoff also is slow. Available water capacity is high. Organic matter content and natural fertility are low. The seasonal high water table is above the surface or within a depth of 1 foot during most winter and spring months. The shrink-swell potential is high. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. The response to soil amendments is good if surface drainage is adequate.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. The wetness and the occasional flooding during brief periods from March to May are management concerns. Land grading and shallow ditches improve surface drainage. Cover crops, crop residue management, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the available water capacity.

This soil is suited to water-tolerant grasses and legumes for pasture and hay, such as tall fescue, reed canarygrass, alsike clover, and ladino clover. Grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing can improve forage yields and the condition of the soil.

This soil is well suited to ponds and lakes. No limitations affect their construction.

This soil is suited to water-tolerant trees. The equipment limitation, the seedling mortality rate, and the hazard of windthrow are management concerns. Equipment should be operated only when the soil is dry or frozen. Reinforcement planting on ridges or selection of container-grown nursery stock increases the seedling survival rate. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely.

This soil is not suited to building site development and onsite waste disposal systems because of the occasional flooding and the seasonal high water table.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

81B—Tonti silt loam, 1 to 3 percent slopes. This very deep, very gently sloping, moderately well drained soil is on broad ridges in the uplands. Individual areas are oval and range from 5 to more than 300 acres in size.

Typically, the surface layer is brown, very friable silt loam about 8 inches thick. The subsoil above the fragipan is about 18 inches thick. It is yellowish brown and strong brown, friable silty clay loam in the upper part and brown and yellowish brown, mottled, firm gravelly silty clay loam in the lower part. Below this to a depth of 60 inches or more is a fragipan of mottled, firm and brittle, very gravelly silty clay loam. In some places the surface layer is darker colored and more than 7 inches thick. In other places the subsoil has less than 15 percent gravel. In some areas the soil is gravelly throughout.

Included with this soil in mapping are small areas of Nixa soils. Nixa soils have less clay and more gravel in the subsoil above the fragipan than the Tonti soil. They are on the lower side slopes. They make up about 5 percent of the map unit.

Permeability is moderate above and below the fragipan in the Tonti soil and slow in the fragipan. Surface runoff is medium. Available water capacity is low. Organic matter content is moderately low, and natural fertility is low. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 26 inches. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust or puddle if left fallow. The response to soil amendments is good.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. A few small areas support native hardwoods. This soil is suited to small grain and grain sorghum. The hazard of erosion and the seasonal wetness are management concerns. An insufficient supply of moisture commonly is a limitation for cultivated crops grown during the summer. A combination of terraces and grassed waterways or tile outlets and contour farming help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. On sites that require excavations to a depth of 4 feet or more, seepage is a hazard. It generally can be

controlled by keeping the excavation shallow and by extending the excavation over an area that is larger than normal. Applications of soda ash, polyphosphate, silty material, or an expanding type of clay reduce the seepage rate.

This soil is suited to trees. The hazard of windthrow is a management concern. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely.

This soil is suited to building site development and to some onsite waste disposal systems. The wetness is a limitation on sites for dwellings. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping can improve surface drainage and thus reduce the wetness on sites for dwellings with basements. Constructing footings and basement walls with adequately reinforced concrete and backfilling with sand or gravel help to prevent the structural damage caused by shrinking and swelling. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. These fields can function adequately if a mound is constructed to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom of the lagoons should not be below the bottom of the fragipan.

The wetness and the potential for frost action are limitations on sites for local roads and streets. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by wetness and frost action.

The land capability classification is IIe. The woodland ordination symbol is 4D.

82B—Rock outcrop-Lithic Udorthents complex, 2 to 5 percent slopes. This map unit consists of very shallow, gently sloping, well drained soils and areas of Rock outcrop on flood plains. The areas of Rock outcrop are intermingled throughout areas of the Lithic Udorthents. The unit is about 70 percent Rock outcrop and 30 percent Lithic Udorthents. Individual areas are irregular in shape and range from 5 to 10 acres in size.

The Rock outcrop consists of ledges, vertical faces of bluffs, and large, rounded, protruding boulders that have sloughed off the bluffs.

Typically, the surface layer of the Lithic Udorthents is dark brown, friable silt loam. Hard bedrock is at a depth of about 5 inches. In places the depth to bedrock is more than 10 inches.

Most areas are used for wildlife habitat or for esthetic purposes. This unit is not suited to cultivated crops, pasture, hay, or trees because of the many areas of Rock outcrop and the depth to bedrock. It generally is not used for building site development, onsite waste disposal systems, or local roads and streets because of the Rock outcrop and the depth to bedrock.

The land capability classification is VIII. No woodland ordination symbol is assigned.

83F—Moko-Rock outcrop complex, 5 to 50 percent slopes. This map unit occurs as areas of very shallow, moderately sloping to very steep, well drained soils and areas of Rock outcrop. The unit is on ridgetops and side slopes of deeply dissected plateaus in the uplands (fig. 9). The areas of Rock outcrop are intermingled throughout areas of the Moko soil. The unit is about 50 percent Moko soil and 40 percent Rock outcrop. Stones cover 3 to 10 percent of the surface in areas of the Moko soil. Individual areas are called glades or cedar glades. They are irregular in shape and range from 5 to more than 80 acres in size.

Typically, the surface layer of the Moko soil is black, very friable very flaggy silty clay loam about 3 inches thick. The subsurface layer is very dark gray, very friable very flaggy silty clay loam about 7 inches thick. Hard dolomite bedrock is at a depth of about 10 inches.

The Rock outcrop consists of ledges, vertical faces of bluffs, and large, rounded, protruding boulders that have sloughed off the bluffs.

Included with this unit in mapping are small areas of Blueye and Hercules soils. Blueye soils are 20 to 40 inches deep to bedrock and are on the higher and lower side slopes. Hercules soils are more than 60 inches deep to bedrock and are on narrow flood plains. Included soils make up about 10 percent of the map unit.

Permeability is moderate in the Moko soil. Surface runoff is rapid. Available water capacity is very low. Organic matter content is moderate, and natural fertility is medium.

Most areas support eastern redcedar. A few small areas are used for pasture. This map unit is not suited to cultivated crops because of the slope, the depth to bedrock, the Rock outcrop, and the stones.

The Moko soil in this map unit generally is not used for pasture because of the Rock outcrop, the stones, the slope, and the depth to bedrock. A few areas support mostly native grasses. Measures to prevent overgrazing in these areas help to control erosion. Locating livestock watering facilities on other soils may be necessary.

Because of low production, the Moko soil generally is not suited to commercial timber management. The main

Figure 9.—Typical landscape in an area of Moko-Rock outcrop complex, 5 to 50 percent slopes.

crop is eastern redcedar, which is used for posts and novelties.

This unit is not suited to building site development, onsite waste disposal systems, or local roads and streets because of the depth to bedrock, the Rock outcrop, and the short, steep breaks.

The land capability classification is VIIs. The woodland ordination symbol is 2R. No woodland ordination symbol is assigned to the Rock outcrop.

83G—Rock outcrop-Moko complex, 50 to 95 percent slopes. This map unit occurs as areas of Rock outcrop and areas of very shallow, very steep, well drained Moko soil on rock ledges. The unit is about 50 percent Rock outcrop and 45 percent Moko soil. The areas of Rock outcrop are intermingled throughout areas of the Moko soil. Vertical escarpments that are 40 to 100 feet high are between rock ledges. Stones cover 3 to 10 percent of the surface in areas of the Moko soil. Individual areas are called bluffs. They are narrow and elongated and range from 5 to more than 40 acres in size.

The areas of Rock outcrop consist of ledges, vertical faces of bluffs, and large, rounded, protruding boulders that have sloughed off the bluffs.

Typically, the surface layer of the Moko soil is black, friable very stony silt loam about 4 inches thick. The subsurface layer is dark brown, friable very stony silty clay loam. Hard dolomite bedrock is at a depth of 9 inches.

Included with this unit in mapping are small areas of Blueye soils. Blueye soils are 20 to 40 inches deep to bedrock and are on toe slopes. They make up about 5 percent of the map unit.

Permeability is moderate in the Moko soil. Surface runoff is very rapid. Available water capacity is very low. Organic matter content is moderate, and natural fertility is medium.

Most areas are used for esthetic purposes and for wildlife habitat. This unit usually is sparsely vegetated

with low-quality eastern redcedar, a few hardwood species, and patches of native grasses. It is not suited to cultivated crops, pasture, hay, or timber because of the slope, the depth to bedrock, the stones, and the Rock outcrop.

The Moko soil is not suited to building site development, onsite waste disposal systems, or local roads and streets because of the slope and the Rock outcrop. It is most valued for esthetic purposes; therefore, areas of adjacent soils often are developed intensively. These adjoining areas are highly erodible. If they are developed, water should not be diverted onto or across them.

The land capability classification is VIIs. The woodland ordination symbol is 2R for the Moko soil. No woodland ordination symbol is assigned to the Rock outcrop.

84D—Bardley-Moko-Rock outcrop complex, 5 to 14 percent slopes. This map unit occurs as areas of moderately deep and very shallow, moderately sloping and strongly sloping, well drained soils and areas of Rock outcrop. The unit is on the lower side slopes of deeply dissected plateaus in the uplands. The areas of Rock outcrop are intermingled throughout areas of the Bardley and Moko soils. The unit is about 45 percent Bardley soil, 30 percent Moko soil, and 20 percent Rock outcrop. These components could not be mapped separately at the scale selected for mapping. Stones cover 3 to 10 percent of the surface in areas of the unit. Individual areas are irregular in shape and range from 5 to more than 40 acres in size.

Typically, the surface layer of the Bardley soil is very dark grayish brown, very friable very gravelly silt loam about 2 inches thick. The subsurface layer is brown and dark yellowish brown, very friable very gravelly silt loam about 6 inches thick. The subsoil is dark reddish brown and reddish brown, firm clay. Hard dolomite bedrock is at a depth of about 38 inches. In some places the dark surface layer is more than 7 inches thick. In other places the bedrock is at a depth of 40 to 60 inches.

Typically, the surface layer of the Moko soil is black, very friable very flaggy silty clay loam about 3 inches thick. The subsurface layer is very dark gray, very friable very flaggy silty clay loam about 7 inches thick. Hard dolomite bedrock is at a depth of about 10 inches.

The Rock outcrop consists of ledges, vertical faces of bluffs, and large, rounded, protruding boulders that have sloughed off the bluffs.

Permeability is moderate in the Bardley and Moko soils. Surface runoff is medium. Available water capacity is low in the Bardley soil and very low in the Moko soil. Organic matter content is low in the Bardley soil and moderate in the Moko soil. Natural fertility is medium in both soils.

Most areas support low-grade hardwoods, eastern redcedar, and native grasses and forbs. This unit is not suited to cultivated crops because of the depth to bedrock, the Rock outcrop, a low or very low available water capacity, and the stones.

This unit is moderately suited to some cool-season grasses, such as tall fescue, to some legumes, such as lespedeza and hop clover, and to some warm-season grasses, such as switchgrass. The hazard of erosion, the Rock outcrop, the depth to bedrock, and the stones are severe limitations. Proper stocking rates, timely deferment of grazing, and pasture rotation help to maintain the plant population and control erosion.

This unit is not suited to lakes or ponds because of the slope, the depth to bedrock in areas of the Bardley soil, and the Rock outcrop.

Because of low production, this unit generally is not managed for commercial timber. The main crop is eastern redcedar. It is used for posts and novelties. Some hardwoods are grown for fuel.

This unit is not suited to building site development and onsite waste disposal systems because of the depth to bedrock, the Rock outcrop, and the short, steep breaks.

The land capability classification is VIe. The woodland ordination symbol is 2D for the Bardley soil and 2X for the Moko soil. No woodland ordination symbol is assigned to the Rock outcrop.

85D—Moko-Rock outcrop-Blueye complex, 5 to 14 percent slopes. This map unit occurs as areas of very shallow and moderately deep, moderately sloping and strongly sloping, well drained soils and areas of Rock outcrop. The unit is on toe slopes of monadnocks in the uplands. The areas of Rock outcrop are intermingled throughout areas of the Moko and Blueye soils. The unit is about 40 percent Moko soil, 30 percent Rock outcrop, and 20 percent Blueye soil. These components could not mapped separately at the scale selected for mapping. Stones cover 3 to 10 percent of the surface area of the Moko soil. Individual areas are narrow and elongated or oval and range from 5 to more than 100 acres in size.

Typically, the surface layer of the Moko soil is black, very friable very flaggy silty clay loam in the upper part and very dark gray, very friable very flaggy silty clay loam in the lower part. Hard limestone bedrock is at a depth of about 10 inches.

The Rock outcrop consists of ledges, vertical faces of bluffs, and large, rounded, protruding boulders that have sloughed off the bluffs.

Typically, the surface layer of the Blueye soil is

black, very friable gravelly silt loam about 12 inches thick. The subsoil is very dark brown, friable gravelly silty clay loam in the upper part; dark yellowish brown, firm clay in the next part; and strong brown, firm clay in the lower part. Hard limestone bedrock is at a depth of about 38 inches. In some places the surface layer is lighter colored. In other places the depth to bedrock is more than 40 inches.

Included with this unit in mapping are small areas of Beemont and Branson soils. Beemont soils are 40 to 60 inches deep to bedrock and are in landscape positions similar to those of the Blueye soil. Branson soils are more than 60 inches deep to bedrock and are on broad ridges. Included soils make up about 5 percent of the map unit.

Permeability is moderate in the Moko soil and very slow in the Blueye soil. Surface runoff is medium on both soils. Available water capacity is very low in the Moko soil and low in the Blueye soil. Organic matter content is moderate in both soils, and natural fertility is medium. The shrink-swell potential is high in the Blueye soil.

Most areas support eastern redcedar and native grasses. This unit is not suited to cultivated crops because of the depth to bedrock, the Rock outcrop, the stones, and a low or very low available water capacity.

This unit is not suited to pasture. The hazard of erosion, the stones, and a low or very low available water capacity are management concerns. Native grasses can be grazed; however, keeping stocking rates low and preventing overgrazing may be necessary to maintain the plant population and to control erosion.

This unit generally is not suitable as a site for ponds or lakes because of the depth to bedrock.

The Blueye soil is suited to trees, but production is low. No other limitations affect planting or harvesting in areas of the Blueye soil. Because of low production and the stones, the Moko soil generally is not managed for commercial timber. The main crop is eastern redcedar. It is used for posts and novelties.

This unit generally is not used for building site development or onsite waste disposal systems because of the depth to bedrock, the Rock outcrop, and the stones.

The land capability classification is VIIe. The woodland ordination symbol is 2X for the Moko soil and 2A for the Blueye soil. No woodland ordination symbol is assigned to the Rock outcrop.

85F—Moko-Blueye-Rock outcrop complex, 14 to 50 percent slopes. This map unit occurs as areas of shallow and moderately deep, moderately steep to very steep, well drained soils and areas of Rock outcrop. The unit is on side slopes of deeply dissected plateaus in the uplands. The areas of Rock outcrop are intermingled throughout areas of the Moko and Blueye soils. The unit is 35 percent Moko soil, 30 percent Blueye soil, and 30 percent Rock outcrop. These components could not be mapped separately at the scale selected for mapping. Stones cover 3 to 10 percent of the surface in areas of the Moko soil. Individual areas are narrow and elongated and range from 10 to more than 200 acres in size.

Typically, the surface layer of the Moko soil is black, very friable flaggy silty clay loam about 8 inches thick. The subsoil is black, very friable very flaggy silty clay loam. Hard dolomite bedrock is at a depth of about 16 inches. In places the subsoil has less clay.

Typically, the surface layer of the Blueye soil is very dark grayish brown, friable gravelly silt loam about 6 inches thick. The subsurface layer is dark brown, friable gravelly silt loam about 5 inches thick. The subsoil is dark brown, firm gravelly silty clay in the upper part; dark yellowish brown, firm gravelly clay in the next part; and yellowish brown and brownish yellow, firm clay in the lower part. Hard dolomite bedrock is at a depth of about 37 inches. In some places the surface layer is dark brown. In other places boulders are on the surface.

The Rock outcrop consists of ledges, vertical faces of bluffs, and large, protruding boulders that have sloughed off the bluffs.

Included with this unit in mapping are small areas of Hercules soils. Hercules soils are more than 60 inches deep to bedrock and are on narrow flood plains. They make up about 5 percent of the map unit.

Permeability is moderately slow in the Moko soil and very slow in the Blueye soil. Surface runoff is medium on both soils. Available water capacity is very low in the Moko soil and low in the Blueye soil. Organic matter content is moderate in both soils, and natural fertility is medium. The shrink-swell potential is moderate on the Moko soil and high on the Blueye soil.

Most areas support eastern redcedar, low-grade hardwoods, and native grasses. Some small areas are used for pasture. This unit is not suited to cultivated crops because of the slope, the stones, the depth to bedrock, and the Rock outcrop.

This unit is not suited to pasture. The hazard of erosion, the stones, a low or very low available water capacity, and the Rock outcrop are the major management concerns. The Blueye soil supports some cool-season grasses, such as tall fescue, but management of grasses is difficult in areas of the Moko soil that are intermingled with the Rock outcrop.

Because of low production, the slope, and the Rock outcrop, this unit generally is not managed for commercial timber. The main crop is eastern redcedar. It is used for posts and novelties.

This unit is not suited to building site development and onsite waste disposal systems because of the depth to bedrock and the slope.

The land capability classification is VIIe. The woodland ordination symbol is 2R for the Moko and Blueye soils. No woodland ordination symbol is assigned to the Rock outcrop.

86D—Mano-Gatewood very gravelly silt loams, 5 to 14 percent slopes, extremely stony. These very deep and moderately deep, moderately sloping and strongly sloping, moderately well drained soils are on ridgetops and side slopes of deeply dissected plateaus in the uplands. The Mano soil commonly is on the upper part of the landscape. The unit is about 55 percent Mano soil and 35 percent Gatewood soil. These two soils could not be mapped separately at the scale selected for mapping. Stones cover 3 to 10 percent of the surface in areas of the unit. Individual areas are elongated or irregular in shape and range from 5 to more than 200 acres in size.

Typically, the surface layer of the Mano soil is dark grayish brown and dark gray, very friable very gravelly silt loam about 3 inches thick. The subsurface layer is very friable and friable gravelly silt loam about 10 inches thick. The upper part is pale brown, and the lower part is light yellowish brown and brownish yellow. The subsoil extends to a depth of 68 inches or more. It is brownish yellow and pale brown, friable very gravelly silt loam in the upper part; light yellowish brown and brownish yellow, mottled, firm very gravelly silty clay loam in the next part; and yellowish brown, mottled, very firm clay in the lower part. In places bedrock is at a depth of 40 to 60 inches.

Typically, the surface layer of the Gatewood soil is dark grayish brown and very dark gray, very friable very gravelly silt loam about 4 inches thick. The subsurface layer is pale brown and light yellowish brown, very friable very gravelly silt loam about 5 inches thick. The subsoil is strong brown, mottled, very firm clay in the upper part and yellowish brown, very firm clay in the lower part. Hard dolomite bedrock is at a depth of about 39 inches. In places the subsoil is redder.

Included with these soils in mapping are small areas of Moko soils and areas of Rock outcrop. Moko soils are 10 to 20 inches deep to bedrock. They are in landscape positions similar to those of the Gatewood soil. Included areas make up about 10 percent of the map unit.

Permeability is slow in the Mano and Gatewood soils. Surface runoff is medium. Available water capacity is moderate in the Mano soil and low in the Gatewood soil. Organic matter content is low in both soils, and natural fertility is medium. The shrink-swell potential is high. The response to soil amendments is fair.

Most areas are used for pasture. Some large areas support native hardwoods. These soils are not suited to cultivated crops because of the high content of gravel, the stones on the surface, a low or moderate available water capacity, and the slope.

These soils are suited to most cool-season grasses and legumes for pasture. Suitable pasture plants include tall fescue, orchardgrass, lespedeza, red clover, and crownvetch. The stones on the surface limit the use of conventional equipment.

These soils are moderately suitable as a site for ponds and lakes. The depth to bedrock and seepage are the major management concerns in areas of the Gatewood soil. The slope is a limitation in areas of both soils. The sites that are selected for ponds should be in areas where there is sufficient clay above the bedrock to prevent seepage. The slope can be modified to increase the volume of the ponds and lakes.

These soils are suited to trees. The stones on the surface are a severe limitation affecting tree-planting equipment and in some areas are a limitation affecting hauling. The seedling mortality rate is a limitation in areas of the Mano soil. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils are suited to building site development and to most onsite waste disposal systems. The high shrink-swell potential and the depth to bedrock are limitations on sites for dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel help to prevent the structural damage caused by shrinking and swelling. The Gatewood soil is not suited to dwellings with basements. Septic tank absorption fields function adequately if a mound is constructed. Sewage lagoons can function properly if the site has been leveled, cleared of stones, and sealed with slowly permeable material. Community sewers should be used if they are available.

Low strength, the shrink-swell potential, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or some other suitable base material minimizes the damage caused by low strength. Grading the roads so they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by shrinking and swelling and by frost action.

The land capability classification is VIIs. The woodland ordination symbol is 3X for the Mano soil and 2X for the Gatewood soil.

86F—Mano-Ocie extremely gravelly silt loams, 14 to 50 percent slopes, extremely stony. These very deep and deep, moderately steep to very steep, moderately well drained soils are on side slopes of deeply dissected plateaus in the uplands. The Mano soil commonly is on the upper part of the landscape. The unit is about 60 percent Mano soil and 30 percent Ocie soil. These soils could not be mapped separately at the scale selected for mapping. Stones cover 3 to 10 percent of the surface in areas of the unit. Individual areas are narrow and elongated and range from 5 to more than 100 acres in size.

Typically, the surface layer of the Mano soil is very dark gray, very friable extremely gravelly silt loam about 5 inches thick. The subsurface layer is dark grayish brown and yellowish brown, friable extremely gravelly silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish brown, friable extremely gravelly silt loam and brown and strong brown, friable very gravelly silty clay loam in the upper part; reddish brown, yellowish red, and yellowish brown, firm and very firm gravelly clay in the next part; and yellowish brown and red, very firm clay in the lower part. In places the soil has less chert and is redder.

Typically, the surface layer of the Ocie soil is very dark gray, friable extremely gravelly silt loam about 3 inches thick. The subsurface layer is dark grayish brown and dark brown, very friable extremely gravelly silt loam about 6 inches thick. The subsoil is brown and very dark grayish brown, friable very gravelly silt loam and strong brown and brown, friable extremely gravelly silty clay loam in the upper part; yellowish brown and red, firm gravelly clay in the next part; and yellowish brown and reddish brown, very firm gravelly clay in the lower part. Hard dolomite bedrock is at a depth of about 56 inches.

Included with these soils in mapping are small areas of Blueye, Bardley, and Moko soils and areas of Rock outcrop. Blueye and Bardley soils are 20 to 40 inches deep over bedrock. They are in landscape positions similar to those of the Ocie soil. Moko soils are 10 to 20 inches deep over bedrock and are adjacent to the areas of Rock outcrop on the short, steep breaks. Included areas make up about 15 percent of the map unit.

Permeability is slow in the Mano and Ocie soils. Surface runoff is rapid. Available water capacity is moderate. Organic matter content is low, and natural fertility is medium. The shrink-swell potential is high. The response to soil amendments is fair.

Most areas are wooded. Some areas are used for pasture. These soils are not suited to cultivated crops because of the slope, the high content of gravel, and the large stones on the surface.

These soils are moderately suited to most cool-season grasses and legumes used for pasture. Suitable pasture plants include tall fescue, orchardgrass, lespedeza, red clover, and crownvetch. The hazard of erosion, the slope, and the stones are severe limitations.

These soils are not suitable as a site for ponds and lakes because of the depth to bedrock, the hazard of seepage, and the slope.

These soils are suited to trees. The erosion hazard, the equipment limitation, and the seedling mortality rate are the major concerns in woodland management. Constructing water bars and locating logging roads and skid trails on the contour help to control erosion. Reseeding disturbed areas prevents excessive erosion. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils generally are not used for building site development and onsite waste disposal systems because of the slope, the large stones, and the high shrink-swell potential.

The land capability classification is VIIs. The woodland ordination symbol is 3R.

87F—Moko-Snead-Rock outcrop complex, 14 to 50 percent slopes. This map unit occurs as areas of shallow and moderately deep, moderately steep to very steep, well drained and moderately well drained soils and areas of Rock outcrop. The unit is on side slopes of deeply dissected plateaus in the uplands. The Snead soil is on the higher parts of the unit. The areas of Rock outcrop are intermingled throughout areas of the Moko soil. The unit is about 35 percent Moko soil, 30 percent Snead soil, and 30 percent Rock outcrop. These components could not be mapped separately at the scale selected for mapping. Individual areas are narrow and elongated and range from 5 to more than 200 acres in size.

Typically, the surface layer of the Moko soil is very dark brown, firm very flaggy clay loam about 4 inches thick. The subsoil is very dark grayish brown, firm very flaggy clay loam. Hard dolomite bedrock is at a depth of about 10 inches.

Typically, the surface layer of the Snead soil is very dark gray, friable silty clay loam about 2 inches thick. The subsoil extends to a depth of 29 inches. It is very dark grayish brown, friable silty clay in the upper part and dark gray and light olive brown, firm channery clay in the lower part. The substratum is grayish brown and light olive brown, very firm channery clay about 10 inches thick. Soft shale bedrock is at a depth of 30 to 60 inches. In places boulders are on the surface.

Included with this unit in mapping are areas of Blueye and Bardley soils. Blueye and Bardley soils are well drained and are in landscape positions similar to

those of the Snead soil. They make up about 5 percent of the map unit.

Permeability is moderately slow in the Moko soil and slow in the Snead soil. Surface runoff is medium on both soils. Available water capacity is very low in the Moko soil and low in the Snead soil. Organic matter content is moderate in both soils, and natural fertility is medium. A perched water table is at a depth of 2 to 3 feet in the Snead soil during most winter and spring months. The shrink-swell potential is moderate in the Moko soil and high in the Snead soil.

Most areas are wooded. A few small areas are used for pasture. This unit is not suited to cultivated crops because of the slope, the depth to bedrock, the Rock outcrop, and a low or very low available water capacity.

This unit generally is not used for pasture. Some grasses, such as tall fescue and switchgrass, are suited to the unit. If the unit is used for pasture, the erosion, the slope, and the Rock outcrop are the major limitations. Proper stocking rates, timely deferment of grazing, and pasture rotation help to maintain the plant population and control erosion.

This unit is not suitable as a site for ponds and lakes because of the slope, the hazard of seepage, the depth to bedrock, and the Rock outcrop. The sites that are selected for ponds should be in areas where there is sufficient clay above the bedrock to prevent seepage or in areas of nearby soils that are more suitable.

This unit is best suited to trees. Because of the shallow rooting depth and a low or very low available water capacity, commercial timber management generally is not feasible. The main crop is hardwoods that are grown for fuel.

This unit is not suited to building site development or onsite waste disposal systems because of the depth to bedrock, the slope, and the Rock outcrop.

The land capability classification is VIIe. The woodland ordination symbol is 2R for the Moko soil and 3R for the Snead soil. No woodland ordination symbol is assigned to the Rock outcrop.

88D—Blueye-Moko complex, 5 to 14 percent slopes. These moderately deep and shallow, moderately sloping and strongly sloping, well drained soils are on ridgetops and side slopes of deeply dissected plateaus in the uplands. The Blueye soil commonly is in the higher areas. This unit is about 65 percent Blueye soil and 30 percent Moko soil. These soils could not be mapped separately at the scale selected for mapping. Individual areas are narrow and elongated and range from 5 to more than 40 acres in size.

Typically, the surface layer of the Blueye soil is very dark grayish brown, very friable gravelly silt loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable gravelly silt loam about 5 inches thick. The subsoil is strong brown, red, and brown, firm and very firm gravelly clay in the upper part and brown and red, very firm gravelly clay in the lower part. Hard dolomite bedrock is at a depth of about 39 inches. In places the surface layer is dark brown. In other places bedrock is at a depth of 40 to 60 inches.

Typically, the surface layer of the Moko soil is black, firm very flaggy silty clay loam about 3 inches thick. The subsoil is black, firm very flaggy clay loam. Hard dolomite bedrock is at a depth of about 15 inches.

Included with these soils in mapping are small areas of Rock outcrop. These areas of Rock outcrop are commonly on the lower side slopes. They make up about 5 percent of the map unit.

Permeability is very slow in the Blueye soil and moderate in the Moko soil. Surface runoff is medium on both soils. Available water capacity is low in the Blueye soil and very low in the Moko soil. Organic matter content is moderate in both soils, and natural fertility is medium. The shrink-swell potential is high in the Blueye soil and moderate in the Moko soil. The response to soil amendments is fair.

Most areas are used for pasture or hay. Some areas support native hardwoods and eastern redcedar. These soils are not suited to cultivated crops because of the hazard of erosion, the depth to bedrock, and the droughtiness.

These soils are moderately suited to such commonly grown legumes as lespedeza and red clover, to such warm-season grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. Erosion is a hazard in newly seeded areas. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during the summer. Timely seedbed preparation will help ensure a good ground cover.

These soils are not suitable as a site for ponds and lakes because of the slope and the depth to bedrock. Sites for ponds should be located in areas of nearby soils that are more suitable.

Because of low production, these soils generally are not suited to commercial timber management. The main crop is eastern redcedar. It is used for posts and novelties. Some hardwoods are grown for fuel.

These soils generally are not used for building site development and onsite waste disposal systems because of the slope and the depth to bedrock.

The land capability classification is VIe. The woodland ordination symbol is 2A for the Blueye soil and 2X for the Moko soil.

89D—Mano-Ocie very gravelly silt loams, 5 to 14 percent slopes. These very deep and deep, moderately sloping and strongly sloping, moderately well drained soils are on ridgetops and side slopes of deeply dissected plateaus in the uplands. The Mano soil commonly is on the upper part of the landscape. This unit is about 60 percent Mano soil and 30 percent Ocie soil. These soils could not be mapped separately at the scale selected for mapping. Individual areas are elongated or irregular in shape and range from 5 to more than 200 acres in size.

Typically, the surface layer of the Mano soil is brown, very friable very gravelly silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown and brown, very friable very gravelly silt loam in the upper part; brown, very firm gravelly clay in the next part; and brown, mottled, very firm clay in the lower part.

Typically, the surface layer of the Ocie soil is dark brown, very friable very gravelly silt loam about 4 inches thick. The subsurface layer is light yellowish brown and pale brown, very friable very gravelly silt loam about 11 inches thick. The subsoil is light yellowish brown, friable very gravelly silty clay loam in the upper part; yellowish brown, firm gravelly clay in the next part; and yellowish brown, firm clay in the lower part. Hard dolomite bedrock is at a depth of about 49 inches. In some areas the depth to bedrock is less than 40 inches.

Included with these soils in mapping are a few areas of soils that have less than 15 percent gravel in the surface layer and some areas of soils that have a fragipan. Included areas make up about 15 percent of the map unit.

Permeability is slow in the Mano and Ocie soils. Surface runoff is medium. Available water capacity is moderate. Organic matter content is low, and natural fertility is medium. The shrink-swell potential is high. The response to soil amendments is good.

Most areas are used for pasture or hay (fig. 10). Some areas support native hardwoods. These soils are not suited to cultivated crops because of the high content of gravel in the surface layer and the slope.

These soils are suited to most cool-season grasses, legumes, and warm-season grasses used for pasture and hay. Suitable pasture plants include tall fescue, orchardgrass, lespedeza, white clover, red clover, and crownvetch. Some small areas of bermudagrass, switchgrass, and indiangrass have recently been seeded. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during the summer. The high content of gravel on the surface may hinder haying. Using a heavy roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years.

These soils are moderately suitable as a site for ponds and lakes. The depth to bedrock and seepage are moderate limitations in areas of the Ocie soil. The slope is a severe limitation in areas of both soils. The sites that are selected for ponds should be in areas where there is adequate clay above the bedrock to prevent seepage and where the slope can be modified.

These soils are suited to trees. The seedling mortality rate is the main management concern. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils are suited to building site development and to most onsite waste disposal systems. The high shrink-swell potential is the main limitation affecting the construction of dwellings. Constructing footings, foundations, and basement walls with adequately reinforced concrete and backfilling with sand or gravel help to prevent the structural damage caused by shrinking and swelling. Septic tank absorption fields function adequately if they are properly constructed. Community sewers should be used if they are available.

Low strength, the shrink-swell potential, and the potential for frost action are limitations on sites for local roads and streets. Strengthening the subgrade with crushed rock, gravel, or some other suitable base material minimizes the damage caused by low strength. Grading the roads so they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by shrinking and swelling and by frost action.

The land capability classification is VIe. The woodland ordination symbol is 3F.

89F—Mano-Ocie very gravelly silt loams, 14 to 50 percent slopes. These very deep and deep, moderately steep to very steep, moderately well drained soils are on side slopes of deeply dissected plateaus in the uplands. The Mano soil commonly is on the upper part of the landscape. The unit is about 60 percent Mano soil and 30 percent Ocie soil. These soils could not be mapped separately at the scale selected for mapping. Individual areas are narrow and elongated and range from 5 to more than 100 acres in size.

Typically, the surface layer of the Mano soil is brown, very friable very gravelly silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown and light yellowish brown, friable very gravelly silty clay loam in the upper part; yellowish brown, firm clay in the next part; and light olive brown, firm clay in the lower part. In places the soil has less gravel.

Figure 10.—The tall fescue pasture in the foreground is in an area of Mano-Ocie very gravelly silt loams, 5 to 14 percent slopes. The lower areas in the middle ground are Britwater gravelly silt loam.

Typically, the surface layer of the Ocie soil is dark grayish brown, very friable very gravelly silt loam about 5 inches thick. The subsurface layer is light yellowish brown, very friable very gravelly silt loam about 2 inches thick. The subsoil is brownish yellow, friable very gravelly silty clay loam in the upper part; reddish yellow,

firm gravelly silty clay in the next part; and light gray and yellowish brown, very firm clay in the lower part. Hard dolomite bedrock is at a depth of about 42 inches. In some places boulders are on the surface. In other places the depth to bedrock is less than 40 inches.

Included with these soils in mapping are small areas of Rock outcrop. These areas of Rock outcrop are on the small, steep breaks. They make up about 5 percent of the map unit.

Permeability is slow in the Mano and Ocie soils. Surface runoff is rapid. Available water capacity is moderate. Organic matter content is low, and natural fertility is medium. The shrink-swell potential is high. The response to soil amendments is fair.

Most areas are wooded. Some areas are used for pasture. These soils are not suited to cultivated crops because of the slope and the high content of gravel in the surface layer.

These soils are moderately suited to most cool-season grasses, legumes, and warm-season grasses used for pasture. Suitable pasture plants include tall fescue, orchardgrass, lespedeza, red clover, and crownvetch and some warm-season grasses, such as bermudagrass, switchgrass, and indiangrass. Erosion, the slope, and the very gravelly surface layer are severe limitations. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months.

These soils are not suitable as a site for ponds and lakes because of the depth to bedrock, the hazard of seepage, and the slope. Sites for ponds should be located in areas of nearby soils that are more suitable.

These soils are suited to trees. The erosion hazard, the equipment limitation, and the seedling mortality rate are management concerns. Constructing water bars and locating logging roads and skid trails on the contour help to control erosion. Reseeding disturbed areas prevents excessive erosion. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils are not suited to building site development and to most onsite waste disposal systems because of the slope and the high shrink-swell potential.

The land capability classification is VIIe. The woodland ordination symbol is 3R.

91B—Viraton silt loam, 2 to 5 percent slopes. This very deep, gently sloping, moderately well drained soil is on the broad upland ridges and old high terraces. Individual areas are oval and range from 10 to more than 100 acres in size.

Typically, the surface layer is dark brown, very friable silt loam about 7 inches thick. The subsoil above the fragipan is about 12 inches thick. It is yellowish brown and dark brown, very friable silt loam in the upper part and yellowish brown, very friable gravelly silty clay loam in the lower part. Next is a transitional layer of pale brown and yellowish brown, very friable very gravelly silt loam. Below this is a fragipan of mottled, firm and brittle extremely gravelly silt loam. The subsoil below the fragipan extends to a depth of 60 inches or more. It is red, mottled, firm extremely gravelly silty clay in the upper part and red, firm extremely gravelly clay in the lower part.

Included with this soil in mapping are small areas of Britwater soils. Britwater soils do not have a fragipan and are in landscape positions similar to those of the Viraton soil. Also included are small areas of a soil on knobs and breaks that has more gravel throughout and less clay in the subsoil. These included soils make up about 5 percent of the map unit.

Permeability is moderate above the fragipan in the Viraton soil, very slow in the fragipan, and moderately slow below the fragipan. Surface runoff is medium. Available water capacity is low. Organic matter content is moderately low, and natural fertility is low. A perched water table is above the fragipan during most winter and spring months. The rooting depth is restricted by the fragipan at a depth of about 22 inches. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust or puddle if left fallow. The response to soil amendments is good.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. A few small areas support native hardwoods. This soil is suited to small grain and grain sorghum. The hazard of erosion and the seasonal wetness are management concerns. An insufficient supply of moisture commonly is a limitation for cultivated crops grown during the summer. A combination of terraces and grassed waterways or tile outlets and contour farming help to control erosion. A system of conservation tillage that leaves a protective cover of crop residue on the surface and a conservation cropping system that includes pasture and hay crops in the rotation also help to control erosion. Crop residue management, cover crops, and green manure crops help to maintain the content of organic matter, improve tilth, and increase the rate of water infiltration.

This soil is well suited to such legumes as lespedeza and hop clover in pasture mixtures, to such cool-season grasses as tall fescue and orchardgrass, and to such warm-season grasses as switchgrass. It is moderately suited to bermudagrass, alfalfa, and red clover. An insufficient supply of moisture commonly is a limitation affecting pasture and hay during most summer months. Erosion is a hazard in newly seeded areas. It can be

controlled by tilling in a timely manner and establishing a ground cover as soon as possible.

This soil is suitable as a site for ponds and lakes. The slope and seepage are hazards. The sites that are selected should be in areas where the slope can be modified to increase the volume of the ponds and lakes. Seepage can be controlled by keeping the excavation shallow and by extending the excavation over an area that is larger than normal.

This soil is suited to trees. The seedling mortality rate and the hazard of windthrow are management concerns. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate. The stands in areas of this soil should be thinned less intensively and more frequently than those in areas where windthrow is less likely.

This soil is suited to building site development and to some onsite waste disposal systems. The wetness is a limitation on sites for dwellings. Installing tile drains around footings and basement walls helps to prevent the damage to buildings caused by the excessive wetness. Land shaping can improve surface drainage and thus reduce the wetness on sites for dwellings with basements. Constructing footings and basement walls with adequately reinforced concrete and backfilling with sand or gravel minimize any damage caused by shrinking and swelling. The seasonal wetness and the restricted permeability are limitations on sites for septic tank absorption fields. Absorption fields can function adequately if a properly constructed mound system is used to increase the depth to the fragipan. This mound provides more surface exposure for evaporation and allows surface water to drain away from the lateral field. Sewage lagoons generally function adequately if they are properly constructed. The bottom of the lagoons should not be below the bottom of the fragipan.

The wetness and the potential for frost action are limitations on sites for local roads and streets. Grading the roads so that they shed water, constructing roadside ditches, and installing culverts minimize the damage caused by wetness and frost action.

The land capability classification is IIIe. The woodland ordination symbol is 3D.

92A—Secesh silt loam, 0 to 3 percent slopes. This very deep, nearly level and very gently sloping, well drained soil is on low stream terraces along the secondary drainageways. It is subject to rare flooding. Individual areas are elongated and range from 10 to more than 200 acres in size.

Typically, the surface layer is very dark grayish brown, very friable silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is dark brown and very dark grayish brown, very friable silt loam in the upper part; dark brown, friable silty clay loam in the next part; and strong brown and reddish brown, friable very gravelly silty clay loam in the lower part. In places the subsoil has less than 15 percent chert.

Included with this soil in mapping are small areas of Cedargap, Racoon, and Waben soils. Cedargap and Waben soils are gravelly throughout. Cedargap soils are on flood plains, and Waben soils are on low stream terraces. Racoon soils are poorly drained. They are in landscape positions similar to those of the Secesh soil. Included soils make up about 10 percent of the map unit.

Permeability is moderate in the Secesh soil. Surface runoff is slow. Available water capacity is moderate. Organic matter content is moderately low, and natural fertility is medium. The surface layer is friable and can be easily tilled throughout a wide range in moisture content. It tends to crust or puddle if left fallow. The response to soil amendments is good.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. Some areas that have limited access support native hardwoods. This soil is suited to soybeans, small grain, and grain sorghum. Flooding and scouring are management concerns. The excessive runoff from the uplands also is a management concern. Diversion terraces can help protect these soils from this runoff. Stabilizing streambanks and maintaining a good ground cover help to reduce the damage caused by scouring and flooding. Crop residue management helps to maintain the content of organic matter, improves tilth, and increases the rate of water infiltration.

This soil is well suited to such commonly grown legumes as alfalfa and red clover, to such warm-season grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass.

These soils are suited to trees. No major management concerns affect planting or harvesting.

This soil generally is not used for building site development and onsite waste disposal systems because of the rare flooding. Onsite investigation is needed to locate suitable sites that are above known flood levels and can be used for septic tank absorption fields and buildings.

The land capability classification is IIs. The woodland ordination symbol is 3A.

93B—Waben-Cedargap very gravelly silt loams, 0 to 5 percent slopes. These very deep, nearly level to gently sloping, well drained soils are on low stream terraces and narrow flood plains along secondary streams. The Waben soil is in the higher areas. This unit is about 65 percent Waben soil and 30 percent

Cedargap soil. These soils could not be mapped separately at the scale selected for mapping. Flooding is rare in areas of the Waben soil and frequent in areas of the Cedargap soil. Individual areas are narrow and elongated and range from about 5 to more than 100 acres in size.

Typically, the surface layer of the Waben soil is dark brown, very friable very gravelly silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is dark brown, friable very gravelly silty clay loam in the upper part; yellowish brown, very friable extremely gravelly silt loam in the next part; and dark yellowish brown, very friable very gravelly silt loam in the lower part.

Typically, the surface layer of the Cedargap soil is black, friable very gravelly silt loam about 8 inches thick. The subsurface layer is very dark grayish brown, friable, extremely gravelly loam and very dark gray extremely gravelly silty clay loam about 26 inches thick. The substratum to a depth of 60 inches or more is very dark grayish brown and dark yellowish brown, friable, extremely gravelly clay loam.

Included with these soils in mapping are small areas of Secesh soils. Secesh soils contain less chert in the surface layer and the upper part of the subsoil than the Waben and Cedargap soils. They are in the higher positions on low stream terraces. They make up about 5 percent of the map unit.

Permeability is moderately rapid in the Waben soil and moderate in the Cedargap soil. Surface runoff is medium on the Waben soil and slow on the Cedargap soil. Available water capacity is moderate in both soils. Organic matter content is moderately low in the Waben soil and moderate in the Cedargap soil. Natural fertility is medium in both soils. The response to soil amendments is good.

Most areas are used for pasture or hay. Some areas that have limited access support native hardwoods. A few small areas are used for cultivated crops. These soils are suited to small grain, grain sorghum, and soybeans. Flooding, scouring, and an insufficient supply of moisture during the summer are management concerns. The excessive runoff from the uplands also is a management concern. Diversion terraces can help protect these soils from this runoff. Stabilizing streambanks and maintaining a good ground cover help to reduce the damage caused by scouring and flooding.

These soils are suited to such commonly grown legumes as alfalfa and red clover, to such warm-season grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. Erosion is a hazard in newly seeded areas. The high content of gravel can hinder haying. Using a heavy roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years. Proper stocking rates, pasture rotation, and timely deferment of grazing can improve forage quality and yields and the condition of the soil.

These soils generally are not suitable as a site for ponds or lakes because of the hazard of seepage and the flooding.

These soils are suited to trees. The seedling mortality rate is a management concern. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

These soils are not suited to building site development and onsite waste disposal systems because of the flooding.

The land capability classification is IIIw. The woodland ordination symbol is 3F.

94B—Hercules very gravelly silty clay loam, 1 to 5 percent slopes. This very deep, very gently sloping and gently sloping, well drained soil is on flood plains of secondary streams and tributaries. It is occasionally flooded. Individual areas are narrow and elongated and range from 5 to more than 80 acres in size.

Typically, the surface layer is very dark grayish brown, friable very gravelly silty clay loam about 11 inches thick. The subsurface layer is about 21 inches thick. It is very dark grayish brown and dark brown, friable very gravelly silty clay in the upper part; very dark grayish brown, firm very gravelly clay in the next part; and dark brown and very dark grayish brown, firm extremely gravelly clay in the lower part. The substratum to a depth of 60 inches or more is dark brown, firm extremely gravelly clay loam. Some places have less clay throughout. In other places the soil is less than 60 inches deep over bedrock.

Permeability is moderately slow in the Hercules soil. Surface runoff is medium. Available water capacity is low. Organic matter content is moderate, and natural fertility is medium. The shrink-swell potential is moderate. The response to soil amendments is good.

Most areas are used for pasture or hay. Some areas support native hardwoods. A few small areas are used for cultivated crops. This soil is suited to small grain and grain sorghum. Flooding, scouring, and droughtiness are management concerns. The excessive runoff from the uplands also is a management concern. Diversion terraces can help protect these soils from this runoff. Stabilizing streambanks and maintaining a good ground cover help to reduce the damage caused by scouring and flooding.

This soil is suited to such commonly grown legumes as lespedeza and red clover, to such warm-season

grasses as bermudagrass and switchgrass, and to such cool-season grasses as tall fescue and orchardgrass. The gravel on the surface can hinder haying. Using a heavy roller in the spring to press the gravel into the surface layer causes a moderate amount of compaction and may reduce the infiltration rate if the practice is repeated for several years. Proper stocking rates, pasture rotation, and timely deferment of grazing can improve forage quality and yields and the condition of the soil.

This soil generally is not suitable as a site for ponds or lakes because of the hazard of seepage, the high content of gravel, and the flooding.

This soil is suited to trees. The equipment limitation and the seedling mortality rate are management concerns. Planting seedlings by hand may be necessary because of the high content of gravel in the surface layer. Reinforcement planting or selection of container-grown nursery stock increases the seedling survival rate.

This soil is not suited to building site development and onsite waste disposal systems because of the flooding.

The land capability classification is IIIs. The woodland ordination symbol is 3F.

96—Pits-Dumps complex. This map unit consists of open excavations or pits from which limestone or dolomite has been quarried or is now being quarried, nearly level to steep dumps of waste rock and soil material, and stockpiles of marketable stone. Buildings, other structures, and roads used during the processing of the stone or during the manufacturing of agricultural lime are in areas of this unit. The unit is about 85 percent pits and dumps. Individual areas range from less than 5 to more than 50 acres in size.

Typically, each side of a pit or quarry has a vertical face or exposure of limestone or dolomite rock. These exposures extend from the bottom of the pit to a height of 10 to 40 feet. The overburden of soil and unconsolidated soil material above the limestone or dolomite rock is about 5 to 15 feet thick. This overburden is removed before quarrying occurs.

Typically, the dumps consist of piles of waste rock fragments mixed with small amounts of the original soil in the overburden and stockpiles of marketable stone products.

Included with this unit in mapping are areas of Gatewood, Mano, Moko, and Noark soils. In places the surface layer of the included soils has a thin cover of finely broken stone or gravel and other debris. Moko soils are on breaks. The gently sloping Gatewood, Mano, and Noark soils are on the sides and top of ridges in the uplands. Included soils make up about 15 percent of the map unit.

Droughtiness and erosion are severe limitations affecting the growth of plants in this unit. Many areas have large sections that support no vegetation; however, a scant cover of grasses, weeds, and brush grows on the dumps of soil material and a good or fair cover of vegetation grows on the included soils. Most areas where quarry operations are completed or have been abandoned have potential for certain recreational uses, for the development of wildlife habitat, and for the storage of selected waste materials. Reclaimed land around and between the pits has potential to be used for grazing. Because the areas of this map unit vary greatly, onsite investigation is needed to determine the potentials and limitations for any proposed use.

No land capability classification or woodland ordination symbol is assigned.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 48,902 acres in the county, or nearly 10 percent of the total acreage, meets the soil requirements for prime farmland. This small acreage is located throughout the county along the larger perennial streams, in a small area in the northwestern part of the county near the town of Wheaton, and in a small area in the southwestern part of the county near the town of Washburn. The majority of the prime farmland is in areas of the Secesh-Claiborne, Branson-Pembroke, and Hoberg-Creldon-Keeno soil associations. These associations are described in the section "General Soil Map Units." Most of the prime farmland is used for hay and small grain. Grain sorghum or soybeans are grown in some areas near Washburn and Wheaton. Some corn and sorghum are grown to produce silage.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Soils that have limitations, such as a seasonal high water table, frequent flooding during the growing season, or inadequate rainfall, qualify as prime farmland only in areas where these limitations have been overcome by such measures as drainage, flood control, or irrigation. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Dan Philbrick, district conservationist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In 1987, approximately 247,000 acres in Barry County was used for crops, hay, or pasture. Of this total, about 190,000 acres was used for permanent pasture, including 43,000 acres for woodland pasture; 47,000 acres for hay; and 10,000 acres for cultivated crops, mainly soybeans and wheat. Fescue seed is harvested from a large acreage of hay and pasture. Most of the remaining acreage in the county consists of forests, including part of the Cassville Ranger District of the Mark Twain National Forest; Table Rock Lake; housing and recreational development areas; and various miscellaneous areas.

The acreage used for annually cultivated crops has steadily declined. About 132,000 acres was used for such crops in 1900, 40,000 acres in 1950, and 10,000 acres in 1987. The acreage taken out of crop production has historically been converted to pasture or hayland, although many fields have been left to revert back to brush and eventually to timber. The loss of cropland because of highway construction or urban development has been slight. The Corps of Engineers inundated about 11,000 acres when Table Rock Dam was constructed in 1956.

About 48,902 acres in Barry County is prime farmland. An additional 5,453 acres meets the requirements for prime farmland if the soils are protected from flooding or are drained.

The soils in the county are moderately well suited to increased production in areas of pasture, hay, and cropland. Increases in production can be achieved by applying better management practices, such as the selection of suitable crop varieties and the reduction of

overgrazing. Management needs also include applying improvements in technology. This survey can help to apply these management practices.

About 30 percent of the areas used for crops or hay and 40 percent of the areas used for pasture currently are not adequately managed to meet conservation needs. Most of the inadequately managed cropland is in upland areas that have erosion rates too high to allow sustained production over a long period of time. Soil erosion in most areas of cropland or hayland can be held to acceptable levels by applying a system of conservation practices designed for specific fields.

Soil erosion is the major problem on nearly all soils that have a slope of more than 2 percent and are used as cropland. Because of long slopes, some upland soils that have less than 2 percent slopes, such as Tonti and Captina soils, are subject to sheet erosion unless adequate conservation practices are applied.

The loss of the surface layer through erosion results in reduced productivity. It is especially damaging to soils that have a low content of organic matter, a clayey subsoil, or a fragipan. Captina, Creldon, Hoberg, Needleye, Scholten, and Tonti soils have a fragipan. Erosion on these soils is even more serious because it reduces the available water capacity and the effective rooting depth above the fragipan. Also, these soils commonly will have more clay in the plow layer if they become eroded.

Erosion on cropland results in the sedimentation of streams, lakes, and ponds. Controlling erosion minimizes this pollution and improves the quality of water for municipal use, recreation, and fish and wildlife. Erosion-control practices also reduce the cost of cleaning roadside ditches and help to maintain lakes and ponds by minimizing sedimentation.

The most beneficial erosion-control practices in the county are a system of conservation tillage that leaves a protective cover of crop residue on the surface and crop rotations that include grasses and legumes. These practices help to control runoff, increase the rate of water infiltration, and improve tilth and soil productivity. A cropping system that leaves a vegetative cover, a protective cover, or crop residue on the soil minimizes erosion so that the productive capacity of the soil is not affected. Legumes, such as red clover and alfalfa, improve tilth and provide nitrogen.

Erosion-control practices also include contour stripcropping, which helps to control erosion by maintaining contoured strips of meadow or close-growing crops. These grass or grass-legume strips are usually used for hay. The areas between the strips are planted on the contour with row crops. The soils in the county generally are not well suited to terraces, another erosion-control measure.

A system of conservation tillage, such as no-till farming, that leaves a protective cover of crop residue on the surface throughout the year is the most cost-effective system for controlling erosion on cropland. It is becoming more common and is an effective way to control erosion in sloping areas. It can be used on many soils in the county.

Most of the uneroded soils used for crops in the uplands have a surface layer of silt loam and a medium or low content of organic matter. Generally, the structure of these soils deteriorates because of tillage and compaction. Intense rainfall then causes a crust to form on the surface. This crust is hard when dry. It reduces the rate of water infiltration, hinders seed germination, and increases the runoff rate. Regular additions of crop residue, manure, and other organic material improve soil structure and tilth.

Soil drainage and flood control are management concerns on about 0.2 percent of the acreage in the county. Dunning and Racoon soils are naturally wet, and crop production generally is reduced on these soils. Flooding is a hazard on the Elk, Huntington, and Cedargap soils. If flooding occurs, it is commonly during the period December through May.

Soil fertility is naturally low in most soils in the county. Additional plant nutrients are needed on all soils for profitable production. Most soils in the county are naturally acid in the upper part of the root zone. These soils need applications of ground limestone to raise the pH level and calcium level sufficiently for the optimum growth of legumes, row crops, and most grasses. Applications of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. The Cooperative Extension Service and some private firms can provide chemical analysis of soils to determine the kind and amount of fertilizer and lime to apply. A significant amount of poultry litter is produced in the county and is used as fertilizer. This litter must be applied properly to avoid serious water pollution.

Soil tilth is an important factor in seed germination and water infiltration. Soils with good tilth are granular and porous. The tilth of each soil is discussed in the section "Detailed Soil Map Units."

Dunning and Racoon soils are naturally wet. Because these soils commonly stay wet until late in the spring, tilth is a problem. If these soils are tilled when wet, they tend to be cloddy when dry. As a result of the cloddiness, preparing a seedbed is difficult. Fall plowing generally improves the tilth of these soils. It does not result in excessive erosion because the soils are nearly level.

Tall fescue is the most commonly grown cool-season grass in the county, followed by orchardgrass. In 1987,

tall fescue was grown in about 90 percent of the areas used for hay and pasture. Alfalfa is the most commonly grown legume, followed by red clover that is grown in a mixture with grasses. Lespedeza and hop clover are commonly grown in the tall fescue pastures. Warm-season grasses are grown, but the extent of the acreage is not large. Approximately 40,000 acres in the county is harvested for hay, The annual hay production is 1.5 to 2.0 tons per acre.

Tall fescue is the most common forage for beef cattle. Alfalfa, orchardgrass, and forage sorghum are the most common kinds of forage for dairy cattle.

In the smoother areas, tall fescue is often combined for seed in late June. After the seed is harvested, the undergrowth is mowed and baled for hay. If the remaining stubble is not grazed until late fall or early winter, little or no hay is required in 3 out of every 5 years. This method cuts labor and machine costs, but some of the quantity of the fescue and much of the quality are lost.

Tall fescue is not the most palatable forage and does not produce the most beef per acre, but it requires less management than other forages and can survive under many adverse conditions. Because tall fescue does not provide much nutrition to cattle during July and August, some cattle often lose weight when grazing in tall fescue pasture during these months.

Warm-season grasses are being established at an increasing rate. Native warm-season grasses, such as big bluestem, little bluestem, indiangrass, and switchgrass, were dominant in presettlement times. They are probably still the best suited plants for the soils in the county. Thin stands of warm-season grasses even exist in areas of Ozark timberland that are not seriously overgrazed. Many landowners have discovered good stands of bluestem or indiangrass in areas of newly cleared fields where these grasses were not previously evident. Common bermudagrass and switchgrass also are warm-season grasses that are currently grown.

Warm-season grasses require more management than fescue but provide greater returns. They are the only perennial grasses that can be grown during the summer dormancy period of cool-season grasses. They need few applications of fertilizer to provide 3 to 5 tons per acre of excellent quality forage. Their growing season is from late June through early September and is ideal for meeting grazing needs during the summer.

Prescribed burning may be needed in areas of warm-season grasses. It is not absolutely necessary, but it does stimulate the warm-season grasses, reduce competition and brush, and improve wildlife cover. It is usually not an annual practice, but annual burning may increase forage production and thus increase cattle production. Burning is more likely to be needed in 1 out of 3 years or in 2 consecutive years out of 5 years. It should only be done in accordance with a properly prepared burn plan, and the appropriate safety measures should be taken.

Warm-season grasses need fewer applications of fertilizer than cool-season grasses because they use nutrients and moisture more efficiently. Applications of fertilizer should not be made before mid-May, and they should only include the amount of fertilizer that can be used in the current growing season. The grazing height of warm-season grasses needs to be managed more carefully than that of cool-season grasses. When warm-season grasses are used for hay, harvesting dates range from late June for switchgrass to July for big bluestem and indiangrass. Weather is more likely to be favorable for harvesting quality hay during this period.

Specialty Crops

Dr. Emmett McCord, farm management specialist, University of Missouri, helped prepare this section.

Early records of Barry County show that specialty crops, such as small fruits and vegetables, are well suited to the area because of the soils and the favorable climatic conditions.

In Barry County in 1909, 71,450 bushels of Irish potatoes was produced on about 1,100 acres and 5,500 bushels of sweet potatoes was produced on about 103 acres. There was about 2,160 acres of other vegetables, including tomatoes. Many tomato canneries were constructed during this time. In 1910, there was about 411,000 apple trees, 191,300 peach trees, and 13,500 grapevines.

In 1909, about 1,176,990 quarts of strawberries and about 130,000 quarts of blackberries and dewberries were harvested. Strawberries were planted in the spring and were well cultivated throughout the season. Much labor was required to control weeds. Most berry patches were 2 to 3 acres in size, although some patches were as large as 20 acres. The number of 24-quart-capacity crates of strawberries harvested per acre ranged from 75 to 100.

Specialty crops are again becoming more popular as a source of income. They are grown either as a full-time operation or as a supplement to other farm income.

In addition to those fruit crops that were formerly grown, current crops include blueberries, fall raspberries, and purple raspberries. Many vegetables, such as sweet corn, green beans, asparagus, okra, pumpkins, squash, and other popular fresh vegetables, are also grown.

The marketing methods have changed for many of the crops. Many of the producers have pick-your-own (PYO) operations and roadside stands. Producers also

sell at farmers markets, local retail markets, some special markets, and wholesale markets.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit *(10)*. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations or hazards that restrict their use.

Class II soils have moderate limitations or hazards that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations or hazards that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations or hazards that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations or hazards that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations or hazards that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w,s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Bruce Palmer, resource forester, Missouri Department of Conservation, helped prepare this section.

When settlers first came to Barry County in the early 1800's, approximately 60 percent of the county was forested. The forests provided many necessities for the settlers, such as logs and lumber to build houses, firewood, and an abundance of game for food. They also protected the watershed, and thus springs flowed year round. The areas near the springs were an ideal location for grist mills and sawmills. Several small communities were centered near these mills.

Around the turn of the century, much of the forest land in the Missouri Ozarks, including Barry County, was harvested for timber. The timber was sawed into building lumber and into railroad ties for the expanding railroad system. After years of mismanagement, the quality and quantity of timber from the forests steadily declined. The cutover land became open range for livestock, and fires were set each year to kill ticks and snakes and to help establish grasses. The fires contributed to a steady loss of soil fertility, a reduction in the population of wildlife, and an increase in the erosion that carried tons of topsoil and gravel into streams.

In the late 1930's, the U.S. Department of Agriculture, Forest Service, began to purchase land in Barry County and to apply fire protection measures in those areas. Later, the Missouri Department of Conservation applied fire protection measures in other areas of the county. Today, wildfires burn only a small fraction of the acreage that was once burned. Although wildfires are still a threat to forests, grazing by livestock is a more widespread and serious problem. Allowing livestock to graze in wooded areas can damage the root system of trees and can greatly increase the rate of soil erosion. Good forest management includes measures that protect areas from wildfires and grazing.

Because of past mismanagement, many of the trees in the present forest are undesirable species or are inferior in quality. Good management can improve the forest by removing the low-quality trees and by promoting the growth of the vigorous, higher quality species. In the future, quality wood products from Barry County and the surrounding areas will be in demand. This demand, however, will have to be met with smaller areas of forest land because the amount of forest land in the county is diminishing. In 1985, about 200,990 acres, or 40 percent of the total acreage in the county, was forest land.

The soils in the Secesh-Claiborne association have the greatest potential for timber production. They support about 2.5 percent of the forest cover in the county. These bottom-land soils are suited to a variety of quality trees, including black walnut, sycamore, ash, silver maple, and various oak species. The majority of the black walnut stands in the county are found in areas of these soils. Planting black walnut trees along with grain or forage crops provides the landowner with an income until the black walnut crop can provide a financial return. In many areas of this association, the forest has been cleared to the edge of the streams. In these areas a strip of trees that is at least 100 feet wide should be planted on each side of the streams. Reestablishing the riparian corridor helps to provide quality wildlife habitat, control streambank erosion, stabilize stream temperatures, and collect drift during flooding.

The soils in the Branson-Pembroke association have good potential for timber production. They are well suited to a variety of quality hardwood species, including black walnut. They also are suited to nurseries for forest trees, orchards of fruit trees, and vineyards.

Timber production in areas of the Scholten-Tonti association is somewhat limited because of the restrictive layers in the soils. This association supports about 7.5 percent of the forest cover in the county. The common species are black oak, post oak, and hickory interspersed with some scattered areas of walnut. The fragipan in the soils restricts the rooting depth of trees and limits the available moisture. Thinning timber stands frequently and lightly enables the stands to become more productive and reduces the hazard of windthrow in areas of shallow soils. Landowners can also manage forests for Christmas tree production or for short-rotation fuel wood production.

The relatively small Beemont-Yelton-Lily association includes about 1.5 percent of the forest cover in the county. The predominant species are black oak, post oak, blackjack oak, and hickory. Concerns for timber management are the restricted rooting depth that occurs because of bedrock and the presence of a fragipan, sandstone flagstones, a perched water table during wet months, and a low available moisture capacity. Frequent and light thinning of timber stands reduce the hazard of windthrow and help to ensure an optimal growth rate for trees.

The Clarksville-Noark-Nixa association includes about 16.6 percent of the forest cover in the county. The major species in areas of the Clarksville soils are black oak, white oak, post oak, and hickory. The most common species in areas of the Nixa soils are post oak and blackjack oak. Good timber management in areas of these soils provides the landowner with quality sawtimber and fuel wood. Management practices include improvement of timber stands and protection from grazing and wildfires.

The Hailey-Rock outcrop association includes the largest area of forest in the county. About 39.7 percent of the total forest cover is in this association. A variety of commercial species grow in areas of the association. The most common species are white oak, black oak, northern red oak, shortleaf pine, and hickory. Because the soils are steep, they are mostly unsuited to uses other than forest land. They produce some of the best quality timber in the county, including red oak lumber, white oak lumber, and veneer. Shortleaf pine grows on some of the south- and west-facing slopes. It should be favored on these aspects wherever it is growing and should be planted after poor-quality hardwoods are removed. Good timber management in areas of these soils provides the landowner with quality sawtimber and fuel wood.

The Mano-Gatewood-Britwater association and the Mano-Moko-Rock outcrop association include about 32.2 percent of the forest cover in the county. Most of the forest land is in areas of the Mano-Moko-Rock outcrop association because areas of the Mano-Gatewood-Britwater association have been cleared of trees and are used for pasture. The soils in these associations were derived from Ordovician-age dolomite. The soils in the associations mentioned previously in this section were derived from Mississippian-age cherty limestone. The soils derived from dolomite have a higher pH level than the soils derived from limestone and thus are favorable for other species of trees. The common species in areas of the Mano-Gatewood-Britwater association and the Mano-Moko-Rock outcrop association are northern red oak, white oak, post oak, white ash, winged elm, chinkapin oak, eastern redcedar, and hickory. Much of the Mano-Moko-Rock outcrop association is very steep. It is best suited to timber production, wildlife habitat, and watershed protection. Because the depth of the soil varies, a variety of timber species can be grown. In areas of the more shallow soils, eastern redcedar should be favored over hardwoods. It is valued for use as lumber, posts, and novelties. The cedar glades have an understory of native grasses and forbs, which provides wildlife habitat. In areas of the deeper soils, hardwood species should be favored. Good management of these species can produce wood products, such as red oak lumber, white oak lumber, pallet parts, and railroad ties. Good management practices should include improvement of timber stands and protection from fires and grazing.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and N.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed also are subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the

soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

Recreational facilities in Barry County include lakes, rivers, swimming areas, hunting and fishing areas, campgrounds, hiking trails, game courts, motorcycle trails, ballfields, picnic areas, play areas, rodeo arenas, and wildlife viewing areas.

The largest public recreational area in the county is part of Mark Twain National Forest. It is more than 54,000 acres in size. This federally-owned land provides fishing and hunting areas, wildlife viewing areas, and other outdoor recreational areas to the general public. The Piney Creek Wilderness Area is included in Mark Twain National Forest. It is about 7,000 acres in size and has about 15 miles of hiking trails and horse trails.

The Flag Spring State Forest is about 3,350 acres in size, and the Roaring River State Park is about 3,500 acres in size.

The county has four public boat docks and two river access areas. In 1988, the county assessors office listed 24 resorts, 6 church camps, 12 ballfields, 2 miniature golf courses, 5 public swimming pools, 3 full-

sized golf courses, a water slide, and horse riding stables.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Kif Dalton and Bob Schroeppel, private land specialists, Missouri Department of Conservation, helped prepare this section.

Barry County is located in the southwest corner of the state where the presettlement prairie adjoins the Ozark timberland. Early records indicate that approximately 25 square miles, or 3 percent of the total land area in the county, was presettlement tall grass prairie *(6)*. The area where the grassland and timberland merge has diverse geography, climate, soils, and plant and animal distribution. This diversity is evidenced by the convergence of three different natural sections of the Ozark Natural Division within the county. These sections are the White River, Elk River, and Springfield Plateau sections *(8)*.

Since the time of the early settlers, much of the forest land in Barry County has been converted to grassland. Today, approximately 40 percent of the county is forested. The majority of this forest land is in the Mark Twain National Forest in the southeastern part of the county. Other public lands in the county include Flag Spring State Forest, Roaring River State Park, Trout Hatchery and Management Area, and the Stubblefield and Lower Flat Creek river access areas. Nearly the entire northern and western parts of the county are privately owned.

Barry County has 274 known fish and wildlife species. Another 149 species are likely to inhabit the county. Typical nongame species include western chorus frog, yellow-billed cuckoo, American kestrel, pileated woodpecker, eastern chipmunk, central

stoneroller, and three-toed box turtle. The most common game species include white-tailed deer, wild turkey, wood duck, raccoon, eastern cottontail, smallmouth bass, and largemouth bass.

Many typical southwestern species, including scissor-tailed flycatcher, greater roadrunner, and armadillo, are frequently observed in the county. Several species in the county, including Oklahoma salamander, sharp-shinned hawk, Ozark cavefish, Bachman's sparrow, black bear, and black-tailed jackrabbit, are on the State and Federal rare or endangered species lists.

The county has a good population of furbearers. The species harvested for fur in 1986 and 1987 were opossum, striped skunk, muskrat, raccoon, mink, red fox, gray fox, coyote, bobcat, and beaver *(4)*. Based on a cooperative survey of archery hunters, the wildlife indices compiled in 1986 by the Missouri Department of Conservation show that the county has more coyote, gray fox, bobcat, raccoon, and opossum than the state average. This survey is based on the number of sightings per 1,000 hours of hunting trips.

The primary woodland game species are white-tailed deer and wild turkey. The interest in hunting these species is high for hunters from Barry County and from other areas. The interest in hunting squirrel and woodcock is only minor. The woodland areas, especially those in the Mark Twain National Forest, have excellent potential as habitat for ruffed grouse. Some ruffed grouse may inhabit the forest now because of a past release of birds in Stone County, which is adjacent to Barry County. The Missouri Department of Conservation is planning for a future release of grouse in Barry County. All the woodland wildlife species are negatively affected by the misuse of timberland. The most notable example of misuse is the grazing of timberland, which can cause tree damage and the destruction of wildlife habitat and increase erosion and soil compaction.

The population of openland wildlife species, such as bobwhite quail and rabbits, generally is considered low although the interest of hunters is high. Since only 3 percent of the total acreage in the county is used for cropland, there is a shortage of small grain. This shortage limits the winter food supply for many birds and animals. The low quality and poor management of the grassland, however, are the major reasons for the low numbers of openland wildlife species. Nearly 60 percent of the county is used for pasture. Overgrazing in areas of fescue has caused small game numbers to become limited. Increasing the amount of native warm-season grasses could improve the quality and diversity of grassland areas for use as wildlife habitat.

Barry County has very little wetland wildlife habitat. Nearly all of this habitat is either in the upper reaches of Table Rock Lake or along the numerous small streams in the county. Waterfowl species, such as bufflehead, black duck, white-fronted goose, northern shoveler, and common loon have been recorded. The principal species, however, are small populations of wood ducks along the many streams and giant Canada geese in the area of Table Rock Lake. The major bodies of water in the county are Table Rock Lake, Roaring River, Flat Creek, Shoal Creek, Capps Creek, and Sugar Creek. The species fished for sport include rainbow trout, largemouth bass, smallmouth bass, spotted bass, channel catfish, rockbass, bluegill, redhorse sucker, flathead catfish, white bass, bullhead, black crappie, and white crappie. Four active heron rookeries are presently in Barry County. In 1987, the largest rookery had 223 individual birds and 119 active nests.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed

producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings

in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and application of poultry waste. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are

difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Poultry waste is manure and litter from confined poultry operations. The consistency is labile and depends upon the bedding used and whether the waste is diluted or allowed to dry. The material is either solid, slurry, or liquid. If the material has a high content of nitrogen, the application rate is limited.

The soil properties and features considered are those that affect soil absorption, plant growth, microbial activity, susceptibility to water erosion, and the rate and method of application of the waste. Permeability, depth to a seasonal high water table, depth to bedrock, and available water capacity affect absorption. Soil reaction and bulk density affect plant growth and microbial activity. The erosion factor, slope, and susceptibility to flooding are used to measure the potential for water erosion. Depth to a seasonal high water table can interfere with application of the waste.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to help to control water erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan

affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

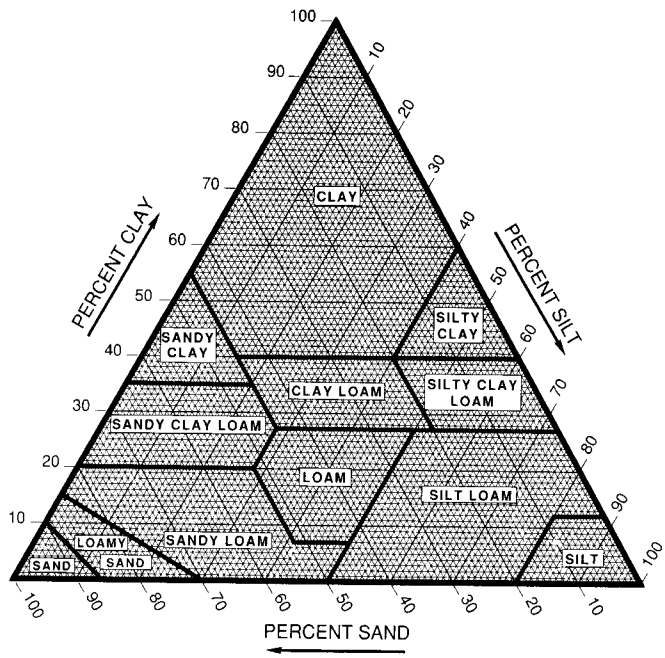

Figure 11.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 11). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering

properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for more certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of

corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(11)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fragiudults (*Fragi*, meaning fragipan, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fragiudults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Fragiudults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series. The Tonti series is an example of fine-loamy, mixed mesic Typic Fragiudults.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(9)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(11)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Barden Series

The Barden series consists of very deep, moderately well drained soils on uplands. Permeability is slow.

These soils formed in a thin mantle of loess or other silty material and in shale residuum. Slopes range from 1 to 3 percent.

Typical pedon of Barden silt loam, in an area of Parsons-Barden-Carytown silt loams, 0 to 3 percent slopes; 1,900 feet north and 1,020 feet west of the southeast corner of sec. 28, T. 22 N., R. 28 W.

Ap—0 to 12 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak very fine granular structure; very friable; few very fine roots; moderately acid; abrupt smooth boundary.

Bt1—12 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine prominent red (2.5YR 4/8) mottles; weak very fine subangular blocky structure; friable; few very fine roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—19 to 27 inches; dark brown (10YR 4/3) silty clay loam; common fine prominent yellowish red (5YR 4/6) and few fine faint dark grayish brown (10YR 4/2) mottles; weak very fine subangular blocky structure; friable; few very fine roots; few faint clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt3—27 to 40 inches; yellowish brown (10YR 5/4) clay loam; many medium prominent strong brown (7.5YR 5/8) and few fine distinct dark grayish brown (10YR 4/2) mottles; weak very fine subangular blocky structure; friable; few faint dark grayish brown clay films on faces of peds; moderately acid; clear smooth boundary.

C1—40 to 44 inches; gray (10YR 6/1) and light brownish gray (10YR 6/2) clay loam; common coarse prominent yellowish brown (10YR 5/6) mottles; massive; friable; slightly acid; gradual smooth boundary.

C2—44 to 55 inches; light gray (10YR 7/1) and light brownish gray (10YR 6/2) sandy clay loam; common coarse distinct yellowish brown (10YR 5/4) mottles; massive; friable; few prominent black iron stains; slightly acid; clear smooth boundary.

C3—55 to 60 inches; yellowish brown (10YR 5/4 and 5/8) silty clay loam; few fine distinct light gray (10YR 7/1) mottles; massive; friable; common prominent black iron stains; slightly acid.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The Bt horizon has chroma of 2 to 6. It is silty clay, silty clay loam, or clay loam. The C horizon is silty clay loam, clay loam, or sandy clay loam.

Bardley Series

The Bardley series consists of moderately deep, well drained soils on uplands. Permeability is moderate. These soils formed in cherty sediments and in material weathered from dolomite or sandstone. Slopes range from 5 to 14 percent.

Typical pedon of Bardley very gravelly silt loam, in an area of Bardley-Moko-Rock outcrop complex, 5 to 14 percent slopes; 2,500 feet north and 2,600 feet east of the southwest corner of sec. 13, T. 22 N., R. 26 W.

Oi—1 inch to 0; partially decomposed and undecomposed leaves, roots, and twigs.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; very friable; many coarse roots; about 40 percent chert fragments; strongly acid; abrupt smooth boundary.

E—2 to 8 inches; brown (7.5YR 5/4) and dark yellowish brown (10YR 4/4) very gravelly silt loam; weak fine granular structure; very friable; many coarse roots; about 40 percent chert fragments; moderately acid; abrupt smooth boundary.

2Bt—8 to 30 inches; dark reddish brown (2.5YR 3/4) clay; moderate fine angular blocky and subangular blocky structure; firm; many coarse roots; many distinct clay films on faces of peds; about 10 percent chert fragments; slightly acid; clear smooth boundary.

2BC—30 to 38 inches; dark reddish brown (2.5YR 3/4) and reddish brown (5YR 4/4) clay; moderate fine subangular and angular blocky structure; firm; many coarse roots; about 15 percent partially decomposed dolomite fragments; neutral; abrupt wavy boundary.

2R—38 inches; dolomite.

The depth to bedrock ranges from 20 to 40 inches. The content of coarse fragments ranges from 15 to 70 percent in the A and E horizons. It generally ranges from 0 to 35 percent in the 2Bt and 2BC horizons, but in some subhorizons it is as much as 50 percent.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. In areas where the surface layer is less than 7 inches thick, value is 3.5 or less. The A horizon is the gravelly or very gravelly analogs of silt loam or loam. The E horizon, if it occurs, has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. It is the gravelly or very gravelly analogs of silt loam or loam. The 2Bt horizon has hue of 2.5YR or 5YR, value

of 3 to 5, and chroma of 4 to 6. It is silty clay, clay, or the gravelly analogs of those textures.

Beemont Series

The Beemont series consists of deep, moderately well drained soils on monadnocks in the uplands. Permeability is very slow. These soils formed in cherty sediments and in material weathered from sandstone, shale, or siltstone. Slopes range from 3 to 20 percent.

Typical pedon of Beemont cobbly very fine sandy loam, 5 to 20 percent slopes, extremely stony, 1,280 feet north and 100 feet west of the southeast corner of sec. 6, T. 21 N., R. 28 W.

Oi—1 inch to 0; partially decomposed and undecomposed leaves, roots, and twigs.
A—0 to 4 inches; dark brown (10YR 4/3) cobbly very fine sandy loam, pale brown (10YR 6/3) dry; weak very fine granular structure; very friable; many fine roots; about 30 percent sandstone fragments; moderately acid; clear smooth boundary.
E—4 to 10 inches; dark yellowish brown (10YR 4/4) cobbly very fine sandy loam; weak very fine granular structure; very friable; common fine roots; about 30 percent sandstone fragments; moderately acid; abrupt smooth boundary.
2Bt1—10 to 13 inches; yellowish red (5YR 4/6) clay; moderate very fine angular blocky structure; firm; few medium roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.
2Bt2—13 to 27 inches; red (2.5YR 4/6) clay; moderate very fine angular blocky structure; firm; few medium roots; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.
2Bt3—27 to 44 inches; yellowish red (5YR 4/6) clay; weak fine angular blocky structure; firm; few medium roots; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.
2C—44 to 49 inches; yellowish red (5YR 5/8) channery sandy clay loam; weak very fine subangular blocky structure; firm; few fine roots; about 20 percent sandstone fragments; very strongly acid; abrupt wavy boundary.
2R—49 inches; sandstone.

The depth to bedrock ranges from 40 to 60 inches. The content of sandstone fragments ranges from 10 to 30 percent in the A and E horizons and from 0 to 15 percent in the 2Bt horizon.

The A horizon has value of 3 to 5 and chroma of 2 or 3. In areas where the surface layer is less than 7 inches thick, value and chroma are 3.5 or less. The A horizon is loam, silt loam, very fine sandy loam, or the cobbly analogs of those textures. The E horizon has value of 4 to 6 and chroma of 2 to 4. It is loam, silt loam, very fine sandy loam, or the cobbly analogs of those textures. The 2Bt horizon has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 3 to 8. It is silty clay or clay.

Blueye Series

The Blueye series consists of moderately deep, well drained soils on uplands. Permeability is very slow. These soils formed in dolomitic limestone residuum. Slopes range from 5 to 30 percent.

Typical pedon of Blueye gravelly silt loam, in an area of Blueye-Moko complex, 5 to 14 percent slopes; 750 feet south and 30 feet east of the northwest corner of sec. 4, T. 21 N., R. 26 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many very fine roots; about 20 percent chert and sandy dolomite fragments; slightly alkaline; clear smooth boundary.
AB—9 to 14 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, grayish brown (10YR 5/2) dry; weak very fine subangular blocky structure parting to weak very fine granular; friable; many very fine roots; about 20 percent chert and sandy dolomite fragments; slightly alkaline; clear smooth boundary.
Bt1—14 to 21 inches; strong brown (7.5YR 4/6) gravelly clay; moderate fine angular blocky structure; firm; few faint clay films on faces of peds; common very fine roots; about 30 percent chert and sandy dolomite fragments; moderately alkaline; gradual smooth boundary.
Bt2—21 to 30 inches; red (2.5YR 4/6) and brown (7.5YR 5/4) gravelly clay; strong medium columnar structure parting to moderate medium angular blocky; very firm; few faint clay films on faces of peds; common very fine roots; about 30 percent chert and sandy dolomite fragments; moderately alkaline; gradual smooth boundary.
Bt3—30 to 39 inches; yellowish brown (10YR 5/4) and red (2.5YR 4/6) gravelly clay; strong medium columnar structure parting to moderate medium angular blocky; very firm; common fine roots; few faint clay films on faces of peds; about 30 percent chert and sandy dolomite fragments; moderately alkaline; abrupt wavy boundary.
R—39 inches; dolomitic limestone.

The depth to bedrock ranges from 20 to 40 inches. The content of coarse fragments ranges from 10 to 50 percent in the A horizon and from 10 to 30 percent in the Bt horizon.

The A or Ap horizon has value of 2 or 3 and chroma of 1 to 3. It is silt loam or the gravelly or very gravelly analogs of that texture. The Bt horizon has hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay, clay, or the gravelly analogs of those textures.

Branson Series

The Branson series consists of very deep, well drained soils on uplands. Permeability is moderate. These soils formed in a thin mantle of loess and in limestone residuum. Slopes range from 1 to 3 percent.

Typical pedon of Branson silt loam, 1 to 3 percent slopes (fig. 12), 2,630 feet south and 1,470 feet west of the northeast corner of sec. 22, T. 22 N., R. 28 W.

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; very friable; many fine roots; strongly acid; abrupt smooth boundary.

E—4 to 12 inches; dark brown (10YR 4/3) silt loam; weak very fine subangular blocky structure parting to weak very fine granular; very friable; many medium roots; strongly acid; clear smooth boundary.

Bt1—12 to 24 inches; strong brown (7.5YR 4/6) silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—24 to 34 inches; variegated red (2.5YR 4/6), dark red (2.5YR 3/6), and brown (10YR 4/3) silty clay; weak fine angular blocky structure; firm; many faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3—34 to 58 inches; dark red (2.5YR 3/6) silty clay; common medium prominent pale brown (10YR 6/3) mottles; weak fine angular blocky structure; firm; many faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt4—58 to 60 inches; dark red (2.5YR 3/6) clay; common medium prominent pale brown (10YR 6/3) mottles; weak very fine angular blocky structure; firm; many faint clay films on faces of peds; very strongly acid.

The content of coarse fragments ranges from 0 to 5 percent in the upper 40 inches and from 0 to 35 percent below a depth of 40 inches.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. In areas where the surface layer is less than 6 inches thick, value and chroma are 3.5 or less. The E horizon, if it occurs, has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. It is silt loam or loam. The Bt horizon has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 4 to 8.

Britwater Series

The Britwater series consists of very deep, well drained soils on stream terraces and uplands. Permeability is moderate. These soils formed in silty alluvium that has a high content of gravel and in dolomite residuum. Slopes range from 2 to 5 percent.

Typical pedon of Britwater gravelly silt loam, 2 to 5 percent slopes, 1,800 feet south and 400 feet west of the northeast corner of sec. 13, T. 24 N., R. 25 W.

Ap—0 to 6 inches; dark brown (10YR 4/3) gravelly silt loam, light yellowish brown (10YR 6/4) dry; moderate fine granular structure; very friable; many fine roots; about 15 percent chert fragments; slightly acid; clear smooth boundary.

Bt1—6 to 12 inches; dark brown (7.5YR 4/4) gravelly silty clay loam; moderate fine and medium subangular blocky structure; very friable; common fine roots; few faint clay films on faces of peds; about 15 percent chert fragments; slightly acid; clear smooth boundary.

Bt2—12 to 21 inches; strong brown (7.5YR 5/6) gravelly silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; many faint clay films on faces of peds; about 20 percent chert fragments; strongly acid; clear smooth boundary.

Bt3—21 to 30 inches; yellowish red (5YR 4/6) very gravelly silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many faint clay films on faces of peds; about 45 percent chert fragments; strongly acid; clear smooth boundary.

Bt4—30 to 60 inches; red (2.5YR 4/6) extremely gravelly silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; common faint clay films on faces of peds; about 70 percent chert fragments; strongly acid.

The content of coarse fragments ranges from 0 to 20 percent in the Ap horizon, from 5 to 35 percent in the upper part of the Bt horizon, and from 20 to 70 percent in the lower part of the Bt horizon.

The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The upper part of the Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 to 8. It is silty clay loam or gravelly silty clay loam. The lower part has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 6 to 8. It is the gravelly, very gravelly, or extremely gravelly analogs of silty clay loam or silty clay.

Captina Series

The Captina series consists of very deep, moderately well drained soils on uplands. These soils have a fragipan. Permeability is moderate above and below the fragipan and slow in the fragipan. The soils formed in a thin mantle of loess and in limestone residuum. Slopes range from 1 to 3 percent.

Typical pedon of Captina silt loam, 1 to 3 percent slopes (fig. 13), 2,430 feet north and 130 feet east of the southwest corner of sec. 16, T. 22 N., R. 27 W.

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; very friable; many very fine roots; strongly acid; abrupt smooth boundary.

Bt1—9 to 14 inches; strong brown (7.5YR 5/6) silty clay loam; weak fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—14 to 24 inches; yellowish red (5YR 5/6) silty clay loam; few fine prominent light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btx1—24 to 39 inches; strong brown (7.5YR 5/6) silty clay loam; common medium prominent light brownish gray (10YR 6/2) mottles; weak very thin platy structure; very firm; brittle; few very fine roots in polygonal cracks; few prominent red clay films on faces of peds; very strongly acid; clear smooth boundary.

Btx2—39 to 53 inches; yellowish red (5YR 5/8) silty clay loam; common medium prominent gray (10YR 5/1) mottles; weak very thin platy structure; very firm; brittle; few prominent dark red clay films on faces of peds; very strongly acid; gradual smooth boundary.

Btx3—53 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; common medium prominent light brownish gray (10YR 6/2) mottles; weak very thin platy structure; very firm; brittle; few prominent dark red clay films on faces of peds; very strongly acid.

The depth to the fragipan ranges from 18 to 27 inches. The content of coarse fragments ranges from 0 to 5 percent in the A and Bt horizons and from 0 to 85 percent in the Btx and 2Bt horizons.

The A or Ap horizon has value of 4 and chroma of 2 or 3 or value of 5 and chroma of 3 or 4. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. The Btx horizon is mottled and has hue of 10YR to 5YR, value of 4 to 6, and chroma of 2 to 8. It is silty clay loam, silt loam, or the gravelly or extremely gravelly analogs of those textures. Some pedons have a 2Bt horizon that is below the Btx horizon. This horizon, if it occurs, has hue of 10YR to 2.5YR, value of 3 or 4, and chroma of 4 to 8. It is the gravelly or extremely gravelly analogs of silty clay or clay.

Carytown Series

The Carytown series consists of very deep, poorly drained soils on uplands and stream terraces. Permeability is very slow. These soils formed in sodium-rich shale residuum or in other materials. Slopes range from 0 to 2 percent.

Typical pedon of Carytown silt loam, in an area of Parsons-Barden-Carytown silt loams, 0 to 3 percent slopes; 1,600 feet north and 1,200 feet west of the southeast corner of sec. 28, T. 22 N., R. 28 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) and dark gray (10YR 4/1) silt loam, grayish brown (10YR 5/2) dry; weak thin platy structure; very friable; few fine roots; moderately acid; abrupt smooth boundary.

E—10 to 16 inches; grayish brown (10YR 5/2) silt loam; weak thin platy structure; very friable; few fine roots; strongly acid; abrupt smooth boundary.

Btgn1—16 to 26 inches; mottled dark grayish brown (10YR 4/2), yellowish brown (10YR 5/6), and very dark gray (2.5Y 3/0) clay; weak coarse columnar structure; firm; few fine roots; many faint clay films on faces of peds; few fine rounded concretions of iron and manganese oxide; moderately alkaline; clear smooth boundary.

Btgn2—26 to 40 inches; mottled dark grayish brown (10YR 4/2), light olive brown (2.5Y 5/4), and very dark grayish brown (2.5Y 3/2) clay; weak coarse columnar structure; firm; many faint clay films on faces of peds; few fine rounded concretions of iron and manganese oxide; moderately alkaline; clear smooth boundary.

Cg—40 to 60 inches; gray (5Y 5/1) clay; common medium prominent light olive brown (2.5Y 5/6) mottles; massive; firm; slightly alkaline.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. In areas where the surface layer is less than 6 inches thick, value is 3.5 or less. The E horizon has value of 4 to 6 and chroma of 2 or 3. The Btg horizon has value of 3 or 4 and chroma of 1 to 4. It is silty clay or clay.

Cedargap Series

The Cedargap series consists of very deep, well drained soils on flood plains. Permeability is moderate. These soils formed in silty alluvium that has a high

content of gravel. Slopes range from 0 to 3 percent.

Typical pedon of Cedargap very gravelly silt loam, in an area of Waben-Cedargap very gravelly silt loams, 0 to 5 percent slopes; 710 feet south and 1,200 feet west of the northeast corner of sec. 17, T. 21 N., R. 27 W.

A1—0 to 8 inches; black (10YR 2/1) very gravelly silt loam, dark gray (10YR 4/1) dry; weak very fine granular structure; friable; many coarse roots; about 55 percent chert fragments; neutral; abrupt smooth boundary.

A2—8 to 24 inches; very dark grayish brown (10YR 3/2) extremely gravelly loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; friable; many fine roots; about 85 percent chert fragments; neutral; abrupt wavy boundary.

A3—24 to 34 inches; very dark gray (10YR 3/1) extremely gravelly silty clay loam, grayish brown (10YR 5/2) dry; weak very fine subangular blocky structure; friable; common medium roots; about 75 percent chert fragments; neutral; abrupt wavy boundary.

C1—34 to 48 inches; very dark grayish brown (10YR 3/2) extremely gravelly clay loam; weak very fine subangular blocky structure; friable; common coarse roots; about 70 percent chert fragments; neutral; abrupt wavy boundary.

C2—48 to 60 inches; dark yellowish brown (10YR 3/4) extremely gravelly clay loam; weak very fine subangular blocky structure; friable; few fine roots; about 80 percent chert fragments; neutral.

The content of coarse fragments ranges from 20 to 85 percent throughout the profile. It averages more than 35 percent in the control section.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. It ranges from 24 to 44 inches in thickness. It is the gravelly or extremely gravelly analogs of silt loam or loam. The C horizon has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 1 to 4. It is the gravelly or extremely gravelly analogs of silt loam, silty clay loam, or clay loam.

Claiborne Series

The Claiborne series consists of very deep, well drained soils on stream terraces and upland foot slopes. Permeability is moderate. These soils formed in silty alluvium that has a high content of gravel. Slopes range from 2 to 5 percent.

Typical pedon of Claiborne silt loam, 2 to 5 percent slopes, 520 feet south and 250 feet west of the northeast corner of sec. 31, T. 23 N., R. 27 W.

Ap—0 to 5 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak very fine granular structure; very friable; common fine roots; about 5 percent chert fragments; neutral; clear smooth boundary.

BA—5 to 8 inches; dark brown (10YR 4/3) silt loam; weak very fine subangular blocky structure; friable; common fine roots; about 10 percent chert fragments; neutral; clear smooth boundary.

Bt1—8 to 14 inches; reddish brown (5YR 4/4) gravelly silty clay loam; weak very fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; about 20 percent chert fragments; strongly acid; clear smooth boundary.

Bt2—14 to 19 inches; yellowish red (5YR 4/6) gravelly silty clay loam; moderate very fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; about 20 percent chert fragments; strongly acid; clear smooth boundary.

Bt3—19 to 30 inches; yellowish red (5YR 5/6) gravelly silty clay loam; moderate very fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; about 20 percent chert fragments; strongly acid; clear smooth boundary.

Bt4—30 to 47 inches; yellowish red (5YR 4/6) very gravelly silty clay loam; weak very fine subangular blocky structure; friable; few very fine roots; few faint clay films on faces of peds; few prominent pale brown (10YR 6/3) silt coatings on faces of peds; about 55 percent chert fragments; strongly acid; clear wavy boundary.

Bt5—47 to 60 inches; red (2.5YR 4/6) very gravelly silty clay loam; weak very fine subangular blocky structure; friable; few very fine roots; common distinct dark reddish brown (2.5YR 3/4) clay films on faces of peds; about 35 percent chert fragments; strongly acid.

The content of coarse fragments ranges from 5 to 10 percent in the A horizon, from 5 to 25 percent in the upper part of the Bt horizon, and from 25 to 55 percent in the lower part of the Bt horizon.

The Ap horizon has chroma of 2 to 4. The Bt horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 4 to 8. It is silty clay loam or the gravelly or very gravelly analogs of that texture.

Clarksville Series

The Clarksville series consists of very deep, somewhat excessively drained soils on uplands. Permeability is moderately rapid in the upper part and moderate in the lower part. These soils formed in cherty limestone residuum. Slopes range from 9 to 60 percent.

Typical pedon of Clarksville very gravelly silt loam, in an area of Clarksville-Rock outcrop-Moko complex, 35 to 60 percent slopes; 1,800 feet south and 770 feet west of the northeast corner of sec. 7, T. 21 N., R. 27 W.

Oi—1 inch to 0; partially decomposed and undecomposed leaves, roots, and twigs.
A—0 to 3 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; very friable; common fine roots; about 55 percent chert fragments; very strongly acid; clear smooth boundary.
E—3 to 10 inches; pale brown (10YR 6/3) very gravelly silt loam; weak very fine granular structure; very friable; common medium roots; about 50 percent chert fragments; very strongly acid; clear smooth boundary.
BE—10 to 14 inches; strong brown (7.5YR 5/6) and pale brown (10YR 6/3) very gravelly silt loam; weak very fine subangular blocky structure; very friable; common coarse roots; about 50 percent chert fragments; very strongly acid; clear smooth boundary.
Bt1—14 to 31 inches; yellowish red (5YR 5/6) and red (2.5YR 4/6) very gravelly silty clay loam; weak very fine subangular blocky structure; firm; common coarse roots; common faint clay films on faces of peds; about 50 percent chert fragments; extremely acid; gradual wavy boundary.
Bt2—31 to 41 inches; yellowish red (5YR 4/6) and reddish yellow (7.5YR 6/6) very gravelly silty clay loam; strong very fine angular blocky structure; firm; common coarse roots; common faint clay films on faces of peds; about 45 percent chert fragments; extremely acid; abrupt wavy boundary.
Bt3—41 to 60 inches; dark red (2.5YR 3/6) extremely gravelly clay; moderate very fine angular blocky structure; firm; few coarse roots; common faint clay films on faces of peds; about 70 percent chert fragments; extremely acid.

The content of coarse fragments ranges from 20 to 60 percent in the A and E horizons and from 35 to 80 percent in the Bt horizon. The A or Ap horizon has value of 2 to 6 and chroma of 1 to 3. It is the gravelly or very gravelly analogs of silt loam. The E horizon has value of 4 to 7 and chroma of 2 or 3. It is the gravelly or very gravelly analogs of silt loam. The Bt horizon has hue of 7.5YR to 2.5YR, value of 3 to 6, and chroma of 4 to 6. It is the very gravelly or extremely gravelly analogs of silty clay loam, silty clay, or clay.

Creldon Series

The Creldon series consists of very deep, moderately well drained soils on uplands. These soils have a fragipan. Permeability is moderately slow above the fragipan, very slow in the fragipan, and moderate below the fragipan. These soils formed in silty materials and in limestone residuum. Slopes range from 1 to 3 percent.

Typical pedon of Creldon silt loam, 1 to 3 percent slopes (fig. 14), 100 feet north and 2,100 feet west of the southeast corner of sec. 16, T. 24 N., R. 29 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine granular structure; very friable; many fine roots; moderately acid; abrupt smooth boundary.
Bt1—10 to 15 inches; dark brown (7.5YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; common fine distinct dark brown (10YR 3/3) silt coatings on faces of peds; strongly acid; clear smooth boundary.
Bt2—15 to 22 inches; dark brown (7.5YR 4/4) silty clay loam; common fine prominent dark reddish brown (2.5YR 3/4) and dark red (2.5YR 3/6) mottles; moderate fine subangular blocky structure; firm; common fine roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.
Bt3—22 to 27 inches; yellowish brown (10YR 5/4) silty clay; common fine prominent dark red (2.5YR 3/6) and dark reddish brown (2.5YR 3/4) and common medium faint dark brown (10YR 4/3) mottles; moderate fine subangular blocky structure; firm; common fine roots; common faint clay films on faces of peds; strongly acid; abrupt smooth boundary.
2Btx1—27 to 32 inches; mottled yellowish red (5YR 4/6), brown (10YR 5/3), grayish brown (10YR 5/2), light gray (10YR 7/2), and dark red (2.5YR 3/6) very gravelly silty clay loam; weak medium platy structure; firm and brittle; few faint clay films on faces of peds and in pores; about 40 percent chert fragments; strongly acid; clear smooth boundary.
2Btx2—32 to 50 inches; mottled yellowish red (5YR 4/6), pale brown (10YR 6/3), light gray (10YR 6/1), dark red (2.5YR 3/6), and strong brown (7.5YR 6/6) very gravelly silty clay loam; massive; firm and brittle; few faint clay films in pores; about 35 percent chert fragments; very strongly acid; clear wavy boundary.
3Bt—50 to 60 inches; dark red (2.5YR 3/6) very gravelly clay; light brownish gray (10YR 6/2) streaks; moderate angular blocky structure; firm; few faint clay films on faces of peds; about 40 percent chert fragments; very strongly acid.

The depth to the fragipan ranges from 18 to 30 inches. The content of coarse fragments ranges from 0 to 10 percent in the A and Bt horizons and from 0 to 85 percent in the 2Btx and 3Bt horizons.

The A or Ap horizon has value and chroma of 2 or 3. The Bt horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 to 6. It is silty clay loam or silty clay. The 2Btx horizon is mottled in shades of red, gray, and brown. It is silt loam, silty clay loam, or the gravelly or extremely gravelly analogs of those textures. The 3Bt horizon has value of 3 or 4 and chroma of 6 to 8. It is silty clay, clay, or the gravelly or extremely gravelly analogs of those textures.

Dunning Series

The Dunning series consists of very deep, poorly drained soils on flood plains. Permeability is slow. These soils formed in silty and clayey alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Dunning silt loam, overwashed, 250 feet south and 2,300 feet west of the northeast corner of sec. 33, T. 22 N., R. 28 W.

Ap—0 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; few fine prominent light olive brown (2.5Y 5/4) mottles; weak very fine granular structure; very friable; many very fine roots; slightly acid; gradual smooth boundary.

A—13 to 18 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine granular structure; friable; common very fine roots; neutral; gradual smooth boundary.

Bg—18 to 28 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; few fine distinct dark grayish brown (2.5Y 4/2) mottles; moderate angular blocky structure; firm; common very fine roots; neutral; gradual smooth boundary.

Cg—28 to 60 inches; dark gray (5Y 4/1) silty clay; common medium prominent light yellowish brown (2.5Y 6/4) and olive yellow (2.5Y 6/6) mottles; weak very fine subangular blocky structure; friable; few fine roots; slightly alkaline.

The A or Ap horizon has value of 2 or 3 and chroma of 1 or 2. The Bg horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or less. It is silty clay loam, silty clay, or clay. The Cg horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 2 or less. It is silty clay or clay.

Elk Series

The Elk series consists of very deep, well drained soils on flood plains. Permeability is moderate. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Elk silt loam, in an area of Elk-Huntington silt loams; 700 feet north and 2,100 feet east of the southwest corner of sec. 3, T. 24 N., R. 29 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate very fine granular structure; very friable; common fine roots; moderately acid; gradual smooth boundary.

AB—9 to 19 inches; dark brown (10YR 3/3 and 7.5YR 4/4) silt loam, brown (10YR 5/3) dry; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; moderately acid; gradual smooth boundary.

Bt1—19 to 41 inches; dark brown (7.5YR 4/4 and 3/4) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—41 to 60 inches; strong brown (7.5YR 4/6) silty clay loam; weak fine subangular blocky structure; firm; few faint clay films on faces of peds; about 10 percent rounded chert fragments; strongly acid.

The content of coarse fragments in the solum ranges from 0 to 15 percent, by volume.

The A or Ap horizon has hue of 10YR or 7.5YR and chroma of 2 or 3. The Bt horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

Gatewood Series

The Gatewood series consists of moderately deep, moderately well drained soils on uplands. Permeability is slow. These soils formed in gravelly sediments and in material weathered from dolomite interbedded with shale. Slopes range from 5 to 14 percent.

Typical pedon of Gatewood very gravelly silt loam, in an area of Mano-Gatewood very gravelly silt loams, 5 to 14 percent slopes, extremely stony; 2,100 feet south and 2,330 feet east of the northwest corner of sec. 26, T. 21 N., R. 25 W.

Oi—1 inch to 0; partially decomposed and undecomposed leaves, roots, and twigs.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) and very dark gray (10YR 3/1) very gravelly silt loam, light brownish gray (10YR 6/2) dry; strong very fine granular structure; very friable; many medium roots; about 55 percent chert fragments; stones cover about 3 percent of the surface; neutral; clear smooth boundary.

E—4 to 9 inches; pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) very gravelly silt loam; weak very fine granular structure; very friable; common medium roots; about 55 percent chert fragments; neutral; clear smooth boundary.
2Bt1—9 to 15 inches; strong brown (7.5YR 5/6) clay; many medium prominent red (2.5YR 4/6) mottles; moderate fine angular blocky structure; very firm; common medium roots; few distinct dark brown (10YR 3/3) clay films on faces of peds; about 10 percent chert fragments; moderately acid; clear wavy boundary.
2Bt2—15 to 39 inches; yellowish brown (10YR 5/6) clay; weak very fine angular blocky structure; very firm; common coarse roots; few faint clay films on faces of peds; few fine rounded concretions of iron and manganese oxide; about 5 percent chert fragments; neutral; abrupt wavy boundary.
2R—39 inches; dolomite.

The depth to bedrock ranges from 20 to 40 inches. The content of coarse fragments ranges from 15 to 75 percent in the A and E horizons and from 5 to 15 percent in the 2Bt horizon.

The Ap or A horizon has value of 2 to 4 and chroma of 1 or 2. It is the gravelly or extremely gravelly analogs of silt loam or loam. The E horizon has value of 4 to 6 and chroma of 3 or 4. It is the gravelly or extremely gravelly analogs of silt loam or loam. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is clay or silty clay.

Hailey Series

The Hailey series consists of very deep, excessively drained soils on uplands. Permeability is rapid. These soils formed in cherty limestone residuum. Slopes range from 5 to 60 percent.

Typical pedon of Hailey very gravelly silt loam, in an area of Hailey-Rock outcrop-Moko complex, 35 to 60 percent slopes; 2,150 feet south and 750 feet east of the northwest corner of sec. 25, T. 21 N., R. 27 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) extremely gravelly silt loam, grayish brown (10YR 5/2) dry; strong fine granular structure; very friable; common medium roots; about 80 percent chert fragments; moderately acid; clear smooth boundary.
E—4 to 11 inches; dark brown (10YR 4/3) extremely gravelly silt loam, pale brown (10YR 6/3) dry; weak very fine granular structure; very friable; many coarse roots; about 65 percent chert gravel and 5 percent chert cobbles; strongly acid; gradual smooth boundary.
Bw1—11 to 24 inches; dark yellowish brown (10YR 4/4) very gravelly silt loam; weak very fine subangular blocky structure; very friable; common medium roots; about 35 percent chert gravel and 5 percent chert cobbles; strongly acid; gradual smooth boundary.
Bw2—24 to 30 inches; yellowish brown (10YR 5/4) very gravelly silt loam; weak very fine subangular blocky structure; very friable; common medium roots; about 40 percent chert gravel and 10 percent chert cobbles; very strongly acid; gradual smooth boundary.
Bw3—30 to 37 inches; yellowish brown (10YR 5/6) extremely gravelly silt loam; weak very fine subangular blocky structure; very friable; common medium roots; about 60 percent chert gravel and 15 percent chert cobbles; strongly acid; gradual smooth boundary.
Bw4—37 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly silt loam; weak very fine subangular blocky structure; very friable; few coarse roots; about 60 percent chert gravel and 15 percent chert cobbles; strongly acid.

The content of coarse fragments ranges from 35 to 80 percent throughout the profile.

The A or Ap horizon has value of 2 to 6 and chroma of 1 to 4. It is the very gravelly or extremely gravelly analogs of silt loam. The E horizon has value of 4 to 7 and chroma of 2 to 4. It is the very gravelly or extremely gravelly analogs of silt loam. The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is the very gravelly or extremely gravelly analogs of silt loam.

Hercules Series

The Hercules series consists of very deep, well drained soils on flood plains. Permeability is moderately slow. These soils formed in clayey alluvium that has a high content of gravel. Slopes range from 1 to 5 percent.

Typical pedon of Hercules very gravelly silty clay loam, 1 to 5 percent slopes, 1,100 feet south and 2,200 feet east of the northwest corner of sec. 27, T. 21 N., R. 27 W.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) very gravelly silty clay loam, grayish brown (10YR 5/2) dry; moderate very fine granular structure; friable; common fine roots; about 40 percent chert fragments; slightly acid; clear smooth boundary.
A1—11 to 22 inches; very dark grayish brown (10YR 3/2) and dark brown (7.5YR 3/2) very gravelly silty clay, grayish brown (10YR 5/2) dry; moderate fine angular blocky and subangular blocky structure; friable; few fine roots; about 40 percent chert

fragments; slightly acid; gradual smooth boundary.
A2—22 to 32 inches; very dark grayish brown (10YR 3/2) very gravelly clay, grayish brown (10YR 5/2) dry; moderate fine angular blocky and subangular blocky structure; firm; few fine roots; about 50 percent chert fragments; neutral; gradual wavy boundary.
A3—32 to 44 inches; dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) extremely gravelly clay; moderate fine subangular blocky structure; firm; few fine roots; about 70 percent chert fragments; neutral; gradual wavy boundary.
C—44 to 60 inches; dark brown (10YR 3/3) extremely gravelly clay loam; moderate fine subangular blocky structure; firm; few fine roots; about 45 percent chert fragments; about 30 percent dolomite channers; slightly alkaline.

The thickness of the mollic epipedon ranges from 24 to more than 60 inches. The content of coarse fragments ranges from 20 to 55 percent in the A horizon and from 35 to 85 percent in the C horizon.

The A or Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. It is the gravelly or very gravelly analogs of silt loam, silty clay loam, or loam. The C horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 3 to 6. It is silty clay loam, clay loam, silty clay, clay, or the very gravelly or extremely gravelly analogs of those textures.

Hoberg Series

The Hoberg series consists of very deep, moderately well drained soils on uplands and stream terraces. These soils have a fragipan. Permeability is moderate above and below the fragipan and slow in the fragipan. The soils formed in silty materials and in gravelly limestone residuum. Slopes range from 2 to 5 percent.

Typical pedon of Hoberg silt loam, 2 to 5 percent slopes, 120 feet south and 800 feet west of the northeast corner of sec. 16, T. 24 N., R. 29 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many fine roots; about 5 percent chert fragments; neutral; clear smooth boundary.
Bt1—8 to 18 inches; strong brown (7.5YR 4/6) silty clay loam; weak fine subangular structure; friable; many fine roots; few faint clay films on faces of peds; about 5 percent chert fragments; strongly acid; clear smooth boundary.
Bt2—18 to 24 inches; dark brown (7.5YR 4/4) gravelly silty clay loam; common fine distinct brown (10YR 5/3) and dark brown (10YR 3/3) mottles; moderate very fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; about 25 percent chert fragments; strongly acid; abrupt boundary.
2Btx—24 to 48 inches; mottled brown (7.5YR 5/2), strong brown (7.5YR 5/6), and red (2.5YR 5/6) extremely gravelly silty clay loam; massive; firm; brittle; few fine roots in the upper inch; common distinct clay films in pores; about 80 percent chert fragments; very strongly acid; gradual wavy boundary.
2Bt—48 to 60 inches; red (2.5YR 4/6) and reddish brown (2.5YR 4/4) extremely gravelly silty clay; few distinct light reddish brown (2.5YR 6/4) mottles; moderate fine angular blocky structure; very firm; common faint clay films on faces of peds; about 65 percent chert fragments; very strongly acid.

The depth to the fragipan ranges from 18 to 27 inches. The content of coarse fragments ranges from 0 to 15 percent in the A horizon, from 5 to 40 percent in the Bt horizon, and from 20 to 80 percent in the 2Btx horizon.

The A or Ap horizon has chroma of 2 or 3. The Bt horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. It is silt loam, silty clay loam, or the gravelly or very gravelly analogs of silty clay loam. The 2Btx horizon is mottled and has hue of 10YR to 2.5YR, value of 4 to 7, and chroma of 2 to 6. It is the gravelly or extremely analogs of silt loam or silty clay loam. The 2Bt horizon has value of 3 or 4 and chroma of 4 to 6. It is the gravelly or extremely gravelly analogs of silty clay or clay.

Huntington Series

The Huntington series consists of very deep, well drained soils on flood plains. Permeability is moderate. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Huntington silt loam, in an area of Elk-Huntington silt loams; 1,900 feet north and 300 feet east of the southwest corner of sec. 6, T. 24 N., R. 26 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.
Bw1—10 to 21 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; many fine roots; slightly acid; gradual wavy boundary.
Bw2—21 to 40 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure;

Figure 12.—Typical profile of Branson silt loam, 1 to 3 percent slopes.

Figure 13.—Typical profile of Captina silt loam, 1 to 3 percent slopes.

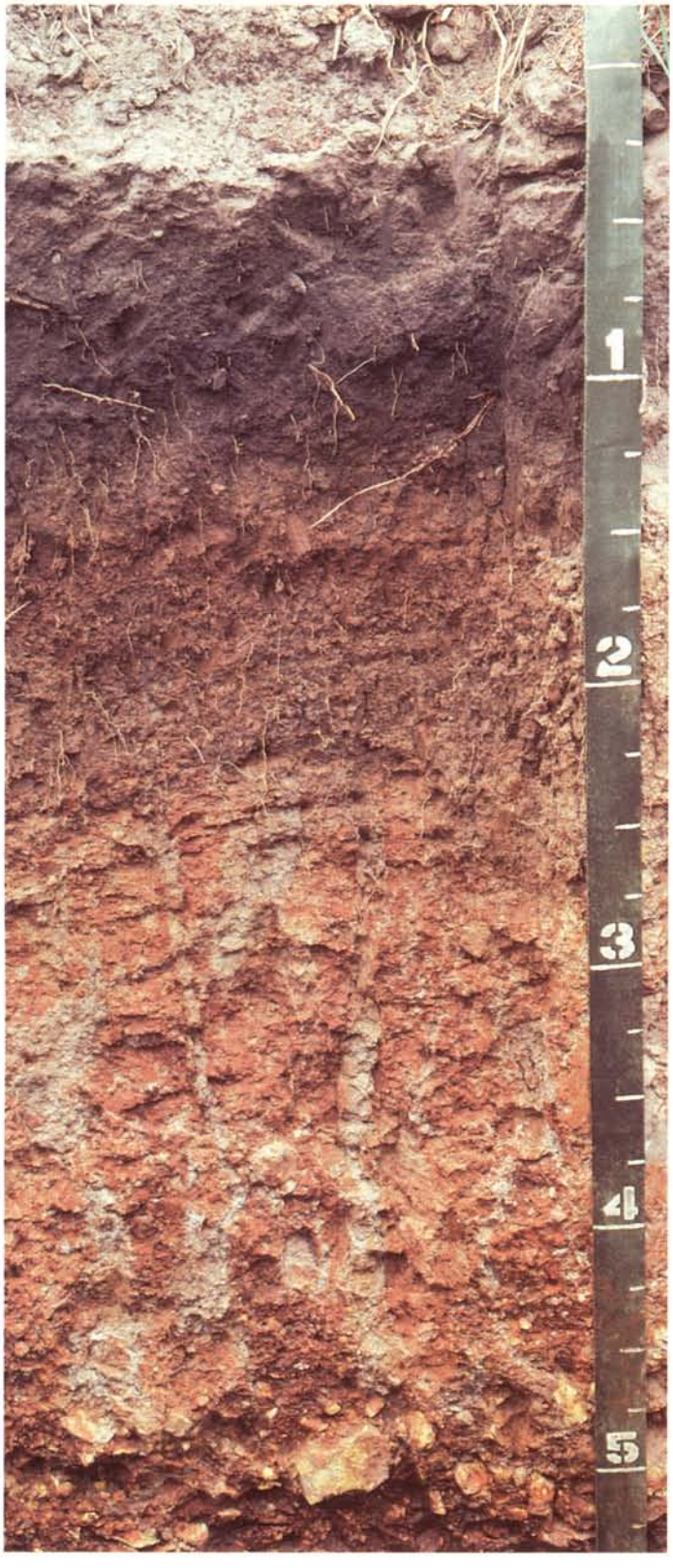

Figure 14.—Typical profile of Creldon silt loam, 1 to 3 percent slopes.

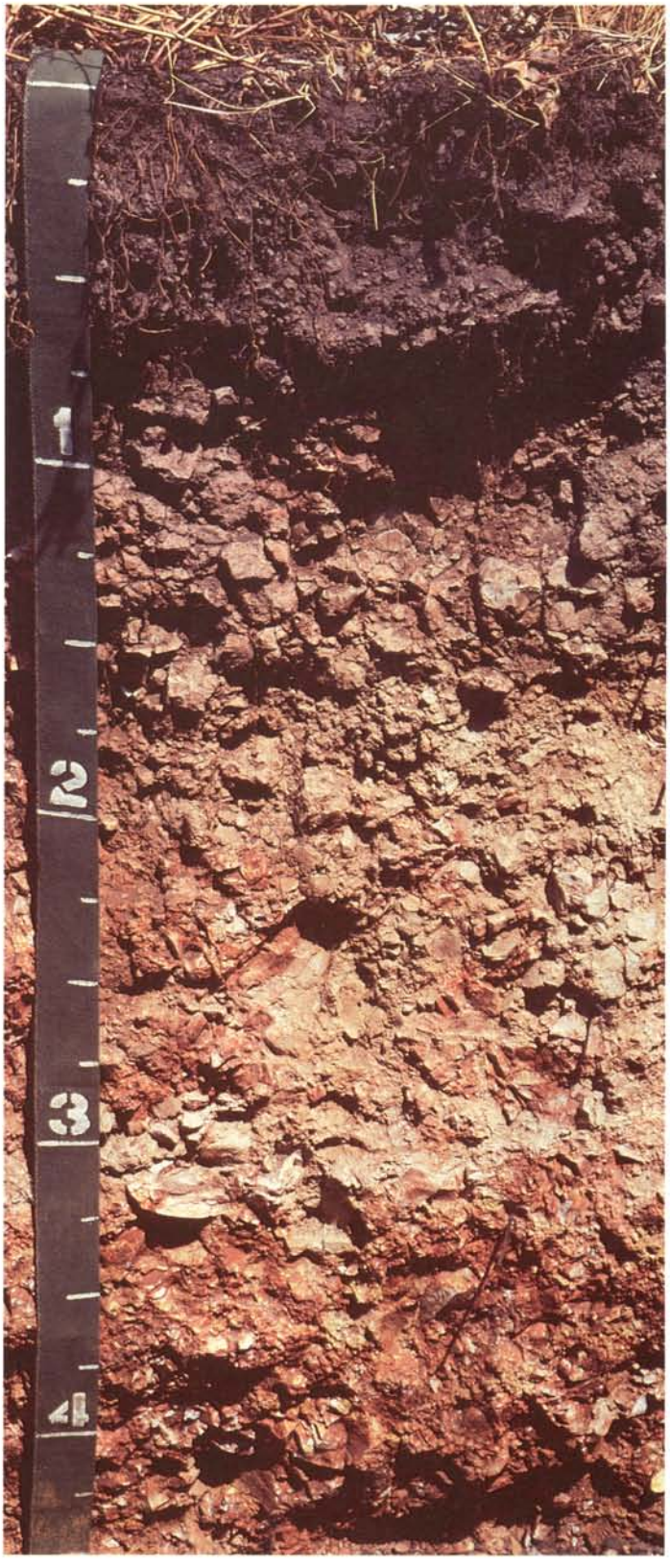

Figure 15.—Typical profile of Keeno very gravelly silt loam, 3 to 9 percent slopes.

Figure 16.—Typical profile of Lily loam, in an area of Lily-Ramsey complex, 2 to 5 percent slopes.

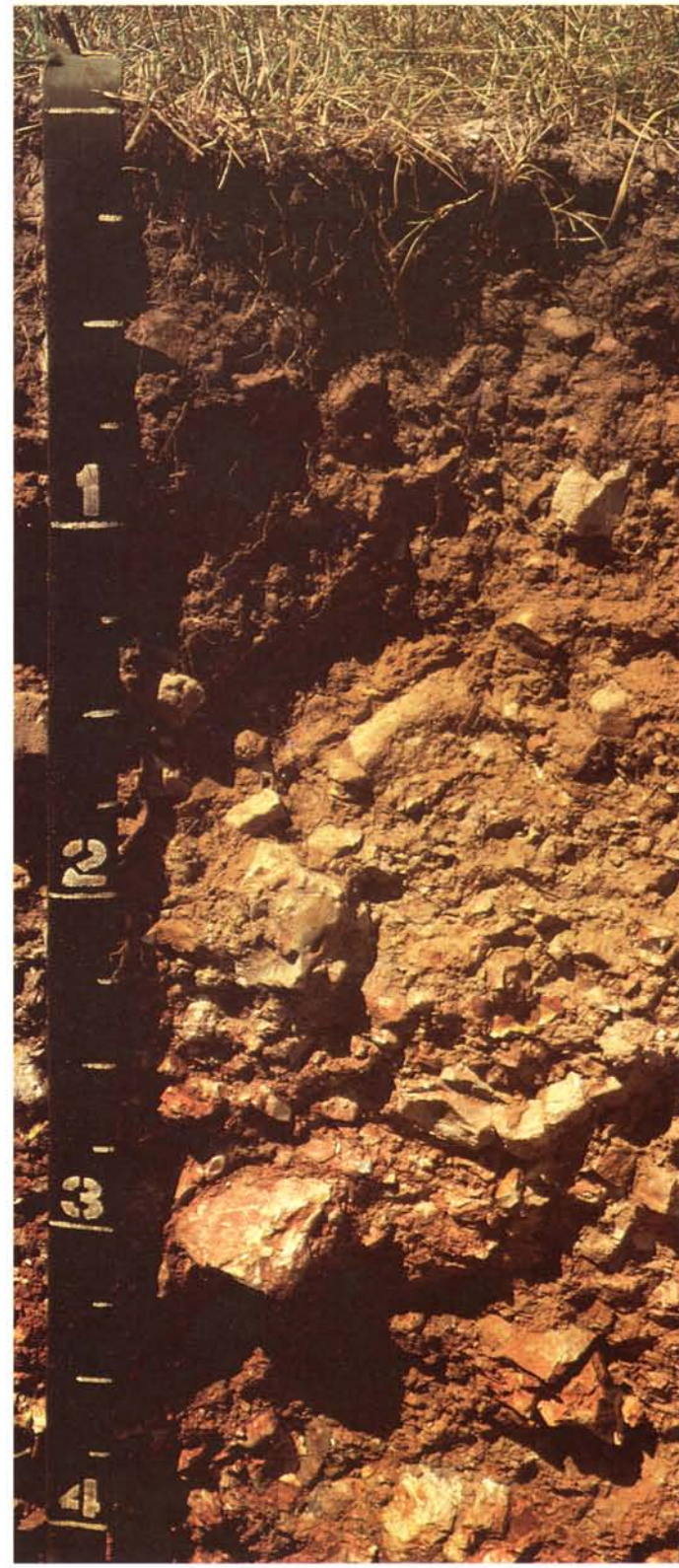

Figure 17.—Typical profile of Scholten gravelly silt loam, 3 to 9 percent slopes.

Figure 18.—Typical profile of Tonti silt loam, in an area of Tonti-Scholten complex, 2 to 6 percent slopes.

Figure 19.—Typical profile of Yelton loam, 2 to 5 percent slopes, eroded.

friable; few fine roots; slightly acid; gradual wavy boundary.
C—40 to 60 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; slightly acid.

The content of coarse fragments is less than 5 percent in the control section. There may be strata of sandy loam or gravel below the control section.

The A or Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

Keeno Series

The Keeno series consists of very deep, moderately well drained soils on uplands. These soils have a fragipan. Permeability is moderate above the fragipan, slow in the fragipan, and moderately rapid below the fragipan. The soils formed in cherty limestone residuum. Slopes range from 3 to 9 percent.

The Keeno soils in this county have a lower base saturation than is definitive for the series. This difference, however, does not significantly affect the use and management of the soils.

Typical pedon of Keeno very gravelly silt loam, 3 to 9 percent slopes (fig. 15), 1,730 feet south and 200 feet west of the northeast corner of sec. 2, T. 24 N., R. 29 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) very gravelly silt loam, grayish brown (10YR 5/2) dry; strong thin platy structure parting to weak very fine granular; very friable; common coarse roots; about 40 percent chert fragments; slightly acid; clear wavy boundary.
BA—10 to 14 inches; dark brown (7.5YR 4/4) very gravelly silty clay loam; moderate very fine subangular blocky structure; friable; few fine roots; few prominent very dark grayish brown (10YR 3/2) silt coatings; about 55 percent chert fragments; moderately acid; clear wavy boundary.
Bt1—14 to 18 inches; strong brown (7.5YR 4/6) extremely gravelly silty clay loam; weak very fine subangular blocky structure; friable; few fine roots; few prominent dark red (2.5YR 3/6) clay films on faces of peds; few prominent pale brown (10YR 6/3) and brown (10YR 4/3) silt coatings; about 60 percent chert fragments; strongly acid; clear wavy boundary.
Bt2—18 to 23 inches; dark yellowish brown (10YR 4/4) and pale brown (10YR 6/3) extremely gravelly silty clay loam; weak fine subangular blocky structure; friable; few fine roots; common prominent dark red clay films on faces of peds; about 75 percent chert fragments; strongly acid; clear wavy boundary.
Btx—23 to 31 inches; mottled grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) extremely gravelly silty clay loam; moderate fine subangular blocky structure; firm; brittle; few fine roots in tops of polygonal cracks; common prominent red clay films on faces of peds; about 70 percent chert fragments; very strongly acid; clear smooth boundary.
2Bt—31 to 60 inches; dark red (2.5YR 3/6) very gravelly clay; light gray (10YR 7/2) streaks; moderate medium and fine angular blocky structure; firm; brittle; common prominent light gray clay films on faces of peds; about 40 percent chert fragments; very strongly acid; clear smooth boundary.

The depth to the fragipan ranges from 18 to 27 inches. The content of coarse fragments ranges from 15 to 55 percent in the A horizon and from 35 to 85 percent in the Bt, Btx, and 2Bt horizons.

The A or Ap horizon has value and chroma of 2 or 3. It is the gravelly or very gravelly analogs of silt loam. The Bt horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 to 6. It is the very gravelly or extremely gravelly analogs of silty clay loam. The Btx horizon is mottled in shades of red, gray, and brown. It is the very gravelly or extremely gravelly analogs of silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 to 6. It is the very gravelly or extremely gravelly analogs of silty clay or clay.

Lily Series

The Lily series consists of moderately deep, well drained soils on uplands. Permeability is moderately rapid. These soils formed in sandstone residuum. Slopes range from 2 to 5 percent.

Typical pedon of Lily loam, in an area of Lily-Ramsey complex, 2 to 5 percent slopes (fig. 16); 890 feet south and 2,020 feet west of the northeast corner of sec. 32, T. 22 N., R. 28 W.

Ap—0 to 9 inches; dark brown (10YR 4/3) loam, light yellowish brown (10YR 6/4) dry; weak very fine granular structure; very friable; many fine roots; few fine rounded concretions of iron and manganese oxide; very strongly acid; clear smooth boundary.
BA—9 to 14 inches; strong brown (7.5YR 5/6) loam; weak very fine subangular blocky structure; friable; common very fine roots; few prominent very dark grayish brown (10YR 3/2) organic stains on faces of peds; few fine rounded concretions of iron and

manganese oxide; very strongly acid; abrupt smooth boundary.
Bt—14 to 24 inches; strong brown (7.5YR 5/6) clay loam; weak fine subangular blocky structure; firm; few very fine roots; few faint clay films on faces of peds; few fine rounded concretions of iron and manganese oxide; about 10 percent sandstone fragments; strongly acid; abrupt smooth boundary.
R—24 inches; sandstone.

The content of sandstone fragments ranges from 0 to 30 percent throughout the profile.

The A or Ap horizon has value of 4 or 5 and chroma of 2 to 4. The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

Mano Series

The Mano series consists of very deep, moderately well drained soils on uplands. Permeability is slow. These soils formed in cherty colluvium and in material weathered from cherty dolomite and interbedded shale. Slopes range from 5 to 50 percent.

Typical pedon of Mano very gravelly silt loam, in an area of Mano-Gatewood very gravelly silt loams, 5 to 14 percent slopes, extremely stony; 250 feet south and 2,130 feet east of the northwest corner of sec. 26, T. 21 N., R. 25 W.

Oi—1 inch to 0; partially decomposed and undecomposed leaves, roots, and twigs.
A—0 to 3 inches; dark grayish brown (10YR 4/2) and dark gray (10YR 4/1) very gravelly silt loam, light brownish gray (10YR 6/2) dry; strong very fine granular structure; very friable; many medium roots; about 30 percent chert gravel and 10 percent chert cobbles; stones cover more than 3 percent of the surface; neutral; clear smooth boundary.
E—3 to 8 inches; pale brown (10YR 6/3) very gravelly silt loam; weak very fine granular structure; very friable; common coarse roots; about 30 percent chert gravel and 10 percent chert cobbles; slightly acid; clear smooth boundary.
EB—8 to 13 inches; light yellowish brown (10YR 6/4) and brownish yellow (10YR 6/6) very gravelly silt loam; weak very fine granular structure; friable; common coarse roots; about 30 percent chert gravel and 10 percent chert cobbles; moderately acid; clear smooth boundary.
Bt1—13 to 21 inches; brownish yellow (10YR 6/6) and pale brown (10YR 6/3) very gravelly silt loam; weak very fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; about 35 percent chert gravel and 5 percent chert cobbles; moderately acid; clear wavy boundary.
Bt2—21 to 33 inches; light yellowish brown (10YR 6/4) and brownish yellow (10YR 6/6) very gravelly silty clay loam; common medium prominent red (2.5YR 4/6) mottles; weak very fine angular blocky structure; firm; few fine roots; few faint clay films on faces of peds; about 40 percent chert gravel; slightly acid; abrupt wavy boundary.
2Bt3—33 to 68 inches; yellowish brown (10YR 5/6) clay; common medium prominent red (2.5YR 4/6) and common fine prominent light brownish gray (10YR 6/2) mottles; weak very fine angular blocky structure; very firm; few fine roots; many faint clay films on faces of peds; few fine rounded concretions of iron and manganese oxide; about 5 percent chert gravel; moderately alkaline.

The content of coarse fragments ranges from 15 to 80 percent in the A, E, and Bt horizons and from 0 to 10 percent in the 2Bt horizon.

The A horizon has value of 3 to 6 and chroma of 1 to 4. It is the gravelly or extremely gravelly analogs of silt loam or loam. The E horizon has value of 4 to 6 and chroma of 2 or 3. It is the gravelly or extremely gravelly analogs of silt loam or loam. The Bt horizon has hue of 10YR to 5YR, value of 3 to 6, and chroma of 4 to 8. It is the gravelly or extremely gravelly analogs of silt loam or silty clay loam. The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is clay or silty clay.

Moko Series

The Moko series consists of very shallow and shallow, well drained soils on uplands. Permeability is moderate. Moko soils formed in dolomitic limestone residuum. Slopes range from 5 to 50 percent.

Typical pedon of Moko very flaggy silty clay loam, in an area of Moko-Rock outcrop complex, 5 to 50 percent slopes; 10 feet north and 800 feet west of the southeast corner of sec. 36, T. 22 N., R. 27 W.

A1—0 to 3 inches; black (10YR 2/1) very flaggy silty clay loam, dark gray (10YR 4/1) dry; moderate very fine granular structure; very friable; many fine roots; about 20 percent chert gravel and 20 percent dolomitic flagstone; stones cover about 2 percent of the surface; neutral; gradual smooth boundary.
A2—3 to 10 inches; very dark gray (10YR 3/1) very flaggy silty clay loam, dark gray (10YR 4/1) dry; weak very fine subangular blocky structure; very friable; common fine roots; about 25 percent chert gravel; about 30 percent dolomitic flagstone;

neutral; abrupt smooth boundary.
R—10 inches; dolomite.

The depth to bedrock ranges from 9 to 20 inches. The content of coarse fragments ranges from 35 to 75 percent throughout the profile.

The A horizon has chroma of 1 or 2. It is the very flaggy or extremely flaggy analogs of silt loam or silty clay loam.

Needleye Series

The Needleye series consists of very deep, somewhat poorly drained soils in the uplands. These soils have a fragipan. Permeability is moderately slow above the fragipan, very slow in the fragipan, and moderate below the fragipan. The soils formed in a thin mantle of loess and in cherty limestone residuum. Slopes range from 1 to 3 percent.

Typical pedon of Needleye silt loam, 1 to 3 percent slopes, 2,150 feet north and 1,750 feet east of the southwest corner of sec. 23, T. 23 N., R. 27 W.

Oi—1 inch to 0; partially decomposed and undecomposed leaves, roots, and twigs.
A—0 to 5 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; weak fine granular structure; friable; many coarse roots; about 5 percent chert fragments; moderately acid; clear smooth boundary.
Bt1—5 to 10 inches; yellowish brown (10YR 5/4) silty clay loam; weak fine subangular blocky structure; friable; many coarse roots; few faint clay films on faces of peds; about 5 percent chert fragments; strongly acid; gradual smooth boundary.
Bt2—10 to 15 inches; yellowish brown (10YR 5/4, 5/4, and 5/6) silty clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; friable; common medium roots; few faint clay films on faces of peds; about 15 percent chert fragments; strongly acid; gradual smooth boundary.
Bt3—15 to 23 inches; light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) silty clay loam; few fine distinct brown (7.5YR 5/4) mottles; moderate fine subangular blocky structure; friable; few medium and coarse roots; few faint clay films on faces of peds; about 5 percent chert fragments; strongly acid; clear smooth boundary.
2Btx1—23 to 31 inches; mottled light brownish gray (10YR 6/2), yellowish red (5YR 4/6), and red (2.5YR 4/8) very gravelly silty clay loam; massive; very firm; brittle; few fine roots in polygonal cracks; few faint clay films on faces of peds; about 45 percent chert fragments; very strongly acid; gradual smooth boundary.
2Btx2—31 to 44 inches; mottled light brownish gray (10YR 6/2), red (2.5YR 4/6), and yellowish brown (10YR 5/6) very gravelly silty clay loam; massive; very firm; brittle; few faint clay films on faces of peds; about 60 percent chert fragments; very strongly acid; clear smooth boundary.
2Bt—44 to 60 inches; dark red (2.5YR 3/6) very gravelly clay; common fine prominent strong brown (7.5YR 5/6) mottles; moderate fine angular blocky structure; firm; few faint clay films on faces of peds; about 55 percent chert fragments; very strongly acid.

The depth to the fragipan ranges from 18 to 27 inches. The content of coarse fragments ranges from 0 to 5 percent in the A horizon and the upper part of the Bt horizon, from 0 to 20 percent in the lower part of the Bt horizon, and from 20 to 60 percent in the 2Btx and 2Bt horizons.

The A or Ap horizon has value of 4 or 5 and chroma of 2 or 3. The upper part of the Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The lower part has value of 4 to 6. It is silty clay loam or gravelly silty clay loam. The 2Btx horizon is the gravelly or very gravelly analogs of silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 6. It is the gravelly or very gravelly analogs of clay or silty clay.

Nixa Series

The Nixa series consists of very deep, moderately well drained soils on uplands. These soils have a fragipan. Permeability is moderate above and below the fragipan and very slow in the fragipan. The soils formed in cherty limestone residuum. Slopes range from 3 to 14 percent.

Typical pedon of Nixa very gravelly silt loam, 3 to 9 percent slopes, 2,200 feet south and 1,000 feet west of the northeast corner of sec. 23, T. 25 N., R. 27 W.

Ap—0 to 3 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; very friable; many fine roots; about 40 percent chert fragments; moderately acid; clear smooth boundary.
E—3 to 10 inches; dark grayish brown (10YR 4/2) very gravelly silt loam; weak very fine granular structure; very friable; common coarse roots; about 40 percent chert fragments; moderately acid; clear smooth boundary.
Bw—10 to 18 inches; yellowish brown (10YR 5/4) very gravelly silt loam; weak very fine subangular blocky

structure; friable; common fine roots; about 50 percent chert fragments; very strongly acid; clear wavy boundary.

E′—18 to 24 inches; pale brown (10YR 6/3) extremely gravelly silt loam; weak very fine granular structure; very friable; common fine roots; about 65 percent chert fragments; very strongly acid; clear smooth boundary.

Btx1—24 to 32 inches; mottled strong brown (7.5YR 5/6) and pale brown (10YR 6/3) extremely gravelly silty clay loam; massive; firm; brittle; few faint clay films on faces of chert and in pores; about 70 percent chert fragments; very strongly acid; clear smooth boundary.

Btx2—32 to 39 inches; mottled strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) very gravelly silty clay loam; massive; brittle; few faint clay films on faces of chert and in pores; about 50 percent chert fragments; very strongly acid; gradual smooth boundary.

Bt1—39 to 45 inches; red (2.5YR 4/6 and 5/6) very gravelly clay; few fine prominent light brownish gray (10YR 6/2) mottles; moderate fine angular blocky structure; firm; common faint clay films on faces of peds; about 35 percent chert fragments; very strongly acid; gradual smooth boundary.

Bt2—45 to 60 inches; dark reddish brown (2.5YR 3/4) very gravelly clay; moderate medium angular blocky structure; firm; common faint clay films on faces of peds; about 35 percent chert fragments; very strongly acid.

The depth to the fragipan ranges from 18 to 27 inches. The content of coarse fragments ranges from 35 to 75 percent in the A, E, Bw, and E horizons and from 25 to 75 percent in the Btx and Bt horizons.

The A or Ap horizon has value of 3 or 4 and chroma of 2 or 3. It is the very gravelly or extremely gravelly analogs of silt loam. The E horizon has value of 5 or 6 and chroma of 2 to 4. It is the very gravelly or extremely gravelly analogs of silt loam. The Bw horizon has value of 5 or 6 and chroma of 3 to 6. It is the very gravelly or extremely gravelly analogs of silt loam or silty clay loam. The E′ horizon has colors and textures similar to those of the E horizon. The Btx horizon is mottled in shades of red, brown, and gray. It is the very gravelly or extremely gravelly analogs of silt loam or silty clay loam. The Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 8. It is the very gravelly or extremely gravelly analogs of silty clay or clay.

Noark Series

The Noark series consists of very deep, well drained soils on uplands. Permeability is moderate. These soils formed in cherty limestone residuum. Slopes range from 5 to 20 percent.

Typical pedon of Noark very gravelly silt loam, in an area of Noark-Clarksville very gravelly silt loams, 5 to 14 percent slopes; 1,950 feet south and 2,550 feet west of the northeast corner of sec. 23, T. 22 N., T. 29 W.

Oi—1 inch to 0; partially decomposed and undecomposed leaves, roots, and twigs.

A—0 to 3 inches; dark grayish brown (10YR 4/2) very gravelly silt loam; moderate very fine granular structure; very friable; many coarse roots; about 40 percent angular chert fragments; strongly acid; clear smooth boundary.

E—3 to 9 inches; pale brown (10YR 6/3) very gravelly silt loam; weak very fine granular structure; very friable; many coarse roots; about 45 percent angular chert fragments; very strongly acid; clear smooth boundary.

BE—9 to 13 inches; strong brown (7.5YR 5/6) and pale brown (10YR 6/3) very gravelly silt loam; weak very fine subangular blocky structure; very friable; many coarse roots; about 40 percent chert fragments; very strongly acid; clear smooth boundary.

Bt1—13 to 22 inches; yellowish red (5YR 4/6) very gravelly clay; weak very fine subangular and angular blocky structure; friable; few medium roots; many faint clay films on faces of peds; about 50 percent chert fragments; extremely acid; gradual smooth boundary.

Bt2—22 to 60 inches; dark red (2.5YR 3/6) extremely gravelly clay; yellowish red (5YR 4/6) and yellowish brown (10YR 5/4) streaks; moderate very fine angular blocky structure; firm; few fine roots; many faint clay films on faces of peds; about 65 percent chert fragments; extremely acid.

The content of coarse fragments ranges from 35 to 70 percent in the A, E, BE, and Bt1 horizons and from 50 to 85 percent in the Bt2 horizon.

The A horizon has value of 3 or 4 and chroma of 2 or 3. It is the very gravelly or extremely gravelly analogs of silt loam. The E horizon has value of 5 or 6. It is the very gravelly or extremely gravelly analogs of silt loam. The Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 6 to 8. It is the very gravelly or extremely gravelly analogs of silty clay or clay.

Ocie Series

The Ocie series consists of deep, moderately well drained soils on uplands. Permeability is slow. These soils formed in cherty sediments and in material weathered from cherty dolomite interbedded with

sandstone and shale. Slopes range from 5 to 35 percent.

Typical pedon of Ocie very gravelly silt loam, in an area of Mano-Ocie very gravelly silt loams, 5 to 14 percent slopes; 2,500 feet north and 1,000 feet east of the southwest corner of sec. 32, T. 25 N., R. 25 W.

A—0 to 4 inches; dark brown (10YR 4/3) very gravelly silt loam, light gray (10YR 7/2) dry; moderate very fine granular structure; very friable; common very fine roots; about 35 percent chert fragments; very strongly acid; clear smooth boundary.

E1—4 to 10 inches; light yellowish brown (10YR 6/4) very gravelly silt loam; weak thin and medium platy structure parting to weak very fine granular; very friable; few fine roots; about 35 percent chert fragments; strongly acid; clear smooth boundary.

E2—10 to 15 inches; pale brown (10YR 6/3) very gravelly silt loam; weak thin and medium platy structure parting to weak very fine granular structure; very friable; few fine roots; about 35 percent chert fragments; strongly acid; clear smooth boundary.

Bt1—15 to 21 inches; light yellowish brown (10YR 6/4) very gravelly silty clay loam; moderate very fine subangular blocky structure; friable; few very fine roots; few faint clay films on faces of peds; about 40 percent chert fragments; strongly acid; clear smooth boundary.

2Bt2—21 to 26 inches; yellowish brown (10YR 5/4) gravelly clay; common medium prominent dark red (2.5YR 3/6) mottles; weak fine angular blocky structure; firm; few faint clay films on faces of peds; about 35 percent chert fragments; moderately acid; clear smooth boundary.

2Bt3—26 to 49 inches; yellowish brown (10YR 5/6) clay; weak fine angular blocky structure; firm; few faint clay films on faces of peds; about 10 percent chert fragments; neutral; abrupt wavy boundary.

2R—49 inches; dolomite.

The depth to bedrock ranges from 40 to 60 inches. The content of coarse fragments ranges from 20 to 50 percent in the A and E horizons, from 35 to 60 percent in the Bt horizon, and from 0 to 35 percent in the 2Bt horizon.

The A or Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. It is the gravelly or very gravelly analogs of silt loam or loam. The E horizon has value of 4 to 6 and chroma of 2 to 4. It is the gravelly or very gravelly analogs of silt loam or loam. The Bt horizon has hue of 10YR to 5YR, value of 3 to 6, and chroma of 4 to 8. It is the very gravelly analogs of silty clay loam or silt loam. The 2Bt horizon has hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 2 to 8. It is clay, silty clay, or the gravelly analogs of those textures.

Parsons Series

The Parsons series consists of very deep, somewhat poorly drained soils on uplands. Permeability is very slow. These soils formed in a thin mantle of loess and in shale residuum. Slopes range from 0 to 2 percent.

Typical pedon of Parsons silt loam, in an area of Parsons-Barden-Carytown silt loams, 0 to 3 percent slopes; 1,720 feet north and 850 feet west of the southeast corner of sec. 28, T. 22 N., R. 28 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.

E—8 to 11 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; very friable; common fine roots; strongly acid; abrupt smooth boundary.

Btg1—11 to 16 inches; very dark grayish brown (10YR 3/2) clay; common medium prominent strong brown (7.5YR 5/6) mottles; moderate fine angular blocky structure; firm; common fine roots; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Btg2—16 to 22 inches; grayish brown (10YR 5/2) clay; many medium distinct dark yellowish brown (10YR 4/4) mottles; moderate fine angular blocky structure; firm; few fine roots; few faint clay films on faces of peds; moderately acid; clear smooth boundary.

Btg3—22 to 34 inches; dark grayish brown (10YR 4/2) clay; moderate fine angular blocky structure; firm; few fine roots; few faint clay films on faces of peds; moderately acid; clear smooth boundary.

BC—34 to 40 inches; mottled gray (10YR 6/1) and brownish yellow (10YR 6/8) clay; weak fine angular blocky structure; firm; many coarse concretions of iron and manganese oxide; neutral; clear smooth boundary.

C—40 to 60 inches; mottled gray (10YR 6/1) and brownish yellow (10YR 6/8) clay; massive; firm; many fine concretions of iron and manganese oxide; slightly alkaline.

The A1 or Ap horizon has value of 3 or 4 and chroma of 2. The E horizon has value of 4 or 5 and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 or 2. It is clay loam, silty clay loam, silty clay, or clay.

Pembroke Series

The Pembroke series consists of very deep, well drained soils on uplands. Permeability is moderate. These soils formed in a thin mantle of loess and in limestone residuum. Slopes range from 1 to 3 percent.

Typical pedon of Pembroke silt loam, 1 to 3 percent slopes, 1,050 feet north and 1,050 feet east of the southwest corner of sec. 22, T. 22 N., R. 28 W.

Ap—0 to 10 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak very fine granular structure; very friable; common fine roots; moderately acid; abrupt smooth boundary.
AB—10 to 18 inches; dark brown (7.5YR 3/2) and very dark grayish brown (10YR 3/2) silt loam, brown (7.5YR 5/2) dry; moderate very fine subangular blocky structure; very friable; few very fine roots; moderately acid; gradual smooth boundary.
Bt1—18 to 25 inches; brown (7.5YR 4/4) and reddish brown (5YR 4/3) silty clay loam; moderate very fine subangular blocky structure; friable; few very fine roots; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.
Bt2—25 to 32 inches; reddish brown (5YR 4/4) silty clay loam; moderate very fine subangular blocky structure; friable; few very fine roots; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.
Bt3—32 to 38 inches; red (2.5YR 4/6) silty clay loam; weak very fine subangular blocky structure; friable; few very fine roots; few faint clay films on faces of peds; strongly acid; gradual smooth boundary.
Bt4—38 to 60 inches; dark reddish brown (2.5YR 3/4) silty clay; weak very fine subangular blocky structure; friable; few faint clay films on faces of peds; moderately acid; clear smooth boundary.

The content of coarse fragments to a depth of 40 inches is less than 5 percent. The content of gravel below a depth of 40 inches ranges to as much as 15 percent.

The Ap horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 or 3. It is silt loam or silty clay loam. The Bt horizon has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is silt loam, silty clay loam, or silty clay.

Portia Series

The Portia series consists of very deep, well drained soils on stream terraces and foot slopes. Permeability is moderate. These soils formed in sandstone residuum. Slopes range from 3 to 9 percent.

The Portia soils in this county have a lower base saturation than is definitive for the series. This difference, however, does not significantly affect the use and management of the soils.

Typical pedon of Portia fine sandy loam, 3 to 9 percent slopes, 400 feet south and 1,320 feet west of the northeast corner of sec. 11, T. 21 N., R. 25 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; moderate very thin platy structure; very friable; few very fine roots; slightly acid; clear smooth boundary.
BE—7 to 12 inches; strong brown (7.5YR 4/6) loam; moderate very fine granular structure; very friable; few very fine roots; moderately acid; clear smooth boundary.
Bt1—12 to 16 inches; yellowish red (5YR 4/6) loam; weak very fine subangular blocky structure; firm; few very fine roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.
Bt2—16 to 22 inches; red (2.5YR 4/6) clay loam; moderate very fine subangular blocky structure; friable; few medium roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.
Bt3—22 to 31 inches; red (2.5YR 4/6) clay loam; weak very fine subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; about 10 percent chert gravel; strongly acid.
Bt4—31 to 60 inches; dark red (2.5YR 3/6) sandy clay loam; strong very fine subangular blocky structure; firm; few faint clay films on faces of peds; about 10 percent chert gravel; pockets of sand and gravel; very strongly acid.

The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The Bt horizon has hue of 7.5YR to 2.5YR, value of 4 or 5, and chroma of 4 to 8 or hue of 2.5YR, value of 3, and chroma of 4 to 6. It is fine sandy loam, sandy clay loam, or sandy clay.

Racoon Series

The Racoon series consists of very deep, poorly drained soils on flood plains. Permeability is slow. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Racoon silt loam, 525 feet north and 1,925 feet west of the southeast corner of sec. 3, T. 24 N., R. 29 W.

Ap1—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate thin platy structure; very friable; common coarse roots; few prominent brownish yellow iron stains; slightly acid; abrupt smooth boundary.
Ap2—5 to 9 inches; dark grayish brown (10YR 4/2) silt

loam, grayish brown (10YR 5/2) dry; few fine prominent light brownish gray (10YR 6/2) mottles; moderate fine granular structure; very friable; common coarse roots; common prominent brownish yellow iron stains; slightly acid; abrupt smooth boundary.

E1—9 to 17 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; very friable; common fine roots; few prominent brownish yellow iron stains; moderately acid; clear smooth boundary.

E2—17 to 25 inches; grayish brown (10YR 5/2) silt loam; weak fine subangular blocky structure; very friable; few fine roots; few prominent brownish yellow iron stains; strongly acid; clear smooth boundary.

E3—25 to 30 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent brownish yellow (10YR 6/6) mottles; weak thin platy structure; friable; few fine roots; strongly acid; clear smooth boundary.

Bt1—30 to 43 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent yellowish brown (10YR 5/6) and common medium faint light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; firm; few fine roots; few faint dark grayish brown clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2—43 to 60 inches; gray (10YR 6/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; few faint gray clay films on faces of peds; very strongly acid.

The A or Ap horizon has value of 3 to 5 and chroma of 2. The E horizon has value of 4 to 7 and chroma of 1 or 2. The Bt horizon has value of 5 or 6 and chroma of 1 or 2. Some pedons have thin strata of silty clay.

Ramsey Series

The Ramsey series consists of shallow, somewhat excessively drained soils on uplands. Permeability is rapid. These soils formed in sandstone residuum. Slopes range from 3 to 5 percent.

Typical pedon of Ramsey fine sandy loam, in an area of Lily-Ramsey complex, 2 to 5 percent slopes; 800 feet north and 700 feet west of the southeast corner of sec. 6, T. 21 N., R. 28 W.

Ap—0 to 4 inches; dark brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

Bw—4 to 11 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; friable; many fine roots; about 10 percent sandstone fragments; strongly acid; abrupt smooth boundary.

R—11 inches; sandstone.

The depth to bedrock ranges from 10 to 20 inches. The content of coarse fragments ranges from 0 to 35 percent throughout the profile.

The Ap horizon has value of 3 to 6 and chroma of 2 to 4. The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is loam, fine sandy loam, sandy loam, or the channery analogs of those textures.

Scholten Series

The Scholten series consists of very deep, moderately well drained soils on uplands. These soils have a fragipan. Permeability is moderate above the fragipan, very slow in the fragipan, and moderately rapid below the fragipan. The soils formed in cherty limestone residuum. Slopes range from 3 to 14 percent.

Typical pedon of Scholten gravelly silt loam, 3 to 9 percent slopes (fig. 17), 500 feet south and 1,550 feet west of the northeast corner of sec. 35, T. 24 N., R. 28 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) and dark brown (10YR 4/3) gravelly silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; very friable; many fine roots; about 25 percent chert fragments; neutral; abrupt smooth boundary.

E—6 to 9 inches; light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/4) gravelly silt loam, very pale brown (10YR 7/3) dry; weak thin platy structure; very friable; common very fine roots; about 30 percent chert fragments; neutral; clear wavy boundary.

Bt—9 to 24 inches; yellowish brown (10YR 5/6) very gravelly silty clay loam; moderate fine subangular blocky structure; friable; many fine roots; few faint clay films on faces of peds; about 5 percent chert fragments; extremely acid; clear smooth boundary.

Bx—24 to 33 inches; mottled pale brown (10YR 6/3), light brownish gray (10YR 6/2), strong brown (7.5YR 5/6), and dark red (2.5YR 3/6) very gravelly silt loam; weak thin and medium platy structure; very firm; brittle; about 55 percent chert fragments; extremely acid; abrupt smooth boundary.

2Bt—33 to 60 inches; dark red (2.5YR 3/6) gravelly clay; common fine prominent light gray (10YR 7/1) and common fine prominent light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure; firm; common distinct clay films on faces of peds; about 20 percent chert fragments; extremely acid.

The depth to the fragipan ranges from 18 to 27 inches. The content of coarse fragments ranges from 15 to 40 percent in the A and E horizons, from 35 to 65 percent in the Bt horizon, and from 15 to 85 percent in the Btx and 2Bt horizons.

The Ap or A horizon has value of 3 to 5 and chroma of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 to 4. It is the gravelly or very gravelly analogs of silt loam. The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 6. It is the very gravelly or extremely gravelly analogs of silty clay loam. The Btx horizon is mottled in shades of red, brown, and gray. It is the gravelly or extremely gravelly analogs of silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 to 8. It is the gravelly or extremely gravelly analogs of silty clay or clay.

Secesh Series

The Secesh series consists of very deep, well drained soils on low stream terraces. Permeability is moderate. These soils formed in silty alluvium that has a high content of chert fragments. Slopes range from 0 to 3 percent.

Typical pedon of Secesh silt loam, 0 to 3 percent slopes, 300 feet north and 2,050 feet east of the southwest corner of sec. 18, T. 23 N., R. 28 W.

A—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; very friable; many fine roots; about 5 percent chert fragments; slightly acid; clear smooth boundary.

BA—8 to 12 inches; dark brown (7.5YR 4/4) and very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; very friable; many fine roots; about 5 percent chert fragments; slightly acid; gradual smooth boundary.

Bt1—12 to 23 inches; dark brown (7.5YR 4/4) silty clay loam; moderate very fine subangular structure; friable; common fine roots; few faint clay films on faces of peds; about 10 percent chert fragments; moderately acid; gradual wavy boundary.

2Bt2—23 to 36 inches; strong brown (7.5YR 4/6) very gravelly silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; about 40 percent chert fragments; moderately acid; gradual smooth boundary.

2Bt3—36 to 46 inches; reddish brown (5YR 4/4) very gravelly silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; about 50 percent chert fragments; strongly acid; gradual smooth boundary.

2Bt4—46 to 60 inches; strong brown (7.5YR 4/6) very gravelly silty clay loam; moderate fine subangular blocky structure; friable; few faint clay films on faces of peds; about 40 percent chert fragments; very strongly acid.

The content of coarse fragments ranges from 0 to 10 percent in the A horizon, from 10 to 35 percent in the Bt horizon, and from 25 to 70 percent in the 2Bt horizon.

The A or Ap horizon has value and chroma of 2 or 3. The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is silt loam, silty clay loam, or the gravelly analogs of those textures. The 2Bt horizon has colors similar to those of the Bt horizon. It is silty clay loam, clay loam, or the gravelly or extremely gravelly analogs of those textures.

Snead Series

The Snead series consists of moderately deep, moderately well drained soils on uplands. Permeability is slow. These soils formed in shale residuum. Slopes range from 14 to 20 percent.

Typical pedon of Snead silty clay loam, in an area of Moko-Snead-Rock outcrop complex, 14 to 50 percent slopes; 270 feet south and 2,000 feet west of the northeast corner of sec. 34, T. 22 N., R. 27 W.

Oi—1 inch to 0; partially decomposed and undecomposed leaves, roots, and twigs.

A—0 to 2 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine subangular blocky structure; friable; many coarse roots; about 5 percent limestone flagstones on the surface; moderately alkaline; abrupt smooth boundary.

Bw1—2 to 11 inches; very dark grayish brown (2.5Y 3/2) silty clay, grayish brown (2.5Y 5/2) dry; strong medium subangular blocky structure; friable; many coarse roots; moderately alkaline; clear smooth boundary.

Bw2—11 to 29 inches; dark gray (10YR 4/1) and light olive brown (2.5Y 5/6) channery clay; strong medium subangular blocky structure; firm; few fine roots; about 25 percent soft shale fragments; moderately alkaline; clear smooth boundary.

C—29 to 39 inches; grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) channery clay; massive; very firm; few fine roots; about 20 percent soft shale fragments; moderately alkaline; abrupt smooth boundary.

Cr—39 to 60 inches; gray shale.

The depth to soft shale bedrock ranges from 20 to 40 inches. The content of shale fragments ranges from 0 to 20 percent in the subsoil.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. The Bw and C horizons have hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 to 6. They are silty clay, clay, or the channery analogs of those textures.

Tonti Series

The Tonti series consists of very deep, moderately well drained soils on uplands. These soils have a fragipan. Permeability is moderate above and below the fragipan and slow in the fragipan. The soils formed in gravelly silty material and in limestone residuum. Slopes range from 1 to 5 percent.

Typical pedon of Tonti silt loam, in an area of Tonti-Scholten complex, 2 to 6 percent slopes (fig. 18); 1,450 feet south and 2,520 feet west of the northeast corner of sec. 21, T. 24 N., R. 28 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; weak very fine granular structure; very friable; many coarse roots; about 5 percent subrounded chert fragments; very strongly acid; clear smooth boundary.

BE—7 to 11 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; friable; many coarse roots; about 10 percent subrounded chert fragments; very strongly acid; gradual smooth boundary.

Bt1—11 to 21 inches; strong brown (7.5YR 5/6) gravelly silty clay loam; moderate fine subangular blocky structure; friable; many coarse roots; few faint clay films on faces of peds; about 15 percent subrounded chert fragments; very strongly acid; gradual smooth boundary.

Bt2—21 to 25 inches; strong brown (7.5YR 5/6) gravelly silty clay loam; moderate medium subangular blocky structure; firm; few coarse roots; few faint clay films on faces of peds; about 30 percent subrounded chert fragments; very strongly acid; clear smooth boundary.

2Btx1—25 to 37 inches; mottled grayish brown (10YR 5/2), light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6) very gravelly silty clay loam; weak thick platy structure; very firm; brittle; few fine roots in upper part of polygonal cracks; few faint clay films in pores; about 55 percent chert fragments; very strongly acid; abrupt smooth boundary.

2Btx2—37 to 42 inches; mottled yellowish red (5YR 5/6), grayish brown (10YR 5/2), and light brownish gray (10YR 6/2) very gravelly silty clay loam; weak thick platy structure; very firm; brittle; few prominent dark red clay films on faces of fragments and in pores; about 55 percent chert fragments; very strongly acid; clear smooth boundary.

2Bt—42 to 60 inches; dark red (2.5YR 3/6) very gravelly clay; few fine prominent grayish brown (10YR 5/2) mottles; moderate medium angular blocky structure; very firm; many faint clay films on faces of peds and fragments; about 40 percent chert fragments; very strongly acid.

The depth to the fragipan ranges from 18 to 26 inches. The content of coarse fragments ranges from 0 to 20 percent in the A horizon and the upper part of the Bt horizon, from 15 to 30 percent in the lower part of the Bt horizon, from 20 to 60 percent in the 2Btx horizon, and from 35 to 70 percent in the 2Bt horizon.

The A or Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam or gravelly silty clay loam. The 2Btx horizon has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 2 to 6. It is the gravelly or extremely gravelly analogs of silt loam or silty clay loam. The 2Bt horizon has value of 3 to 5 and chroma of 4 to 6. It is the very gravelly analogs of clay or silty clay.

Viraton Series

The Viraton series consists of very deep, moderately well drained soils on uplands. These soils have a fragipan. Permeability is moderate above the fragipan, very slow in the fragipan, and moderately slow below the fragipan. The soils formed in gravelly silty material and in dolomite residuum. Slopes range from 2 to 5 percent.

Typical pedon of Viraton silt loam, 2 to 5 percent slopes, 2,450 feet north and 1,750 feet east of the southwest corner of sec. 3, T. 21 N., R. 25 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; very friable; common fine roots; about 10 percent chert fragments; slightly acid; clear smooth boundary.

BE—7 to 10 inches; yellowish brown (10YR 5/4) and dark brown (10YR 4/3) silt loam; weak very fine subangular blocky structure; very friable; common fine roots; about 10 percent chert fragments; moderately acid; gradual smooth boundary.

Bt—10 to 19 inches; yellowish brown (10YR 5/4) gravelly silty clay loam; moderate very fine subangular blocky structure; very friable; few fine

roots; few faint clay films on faces of peds; about 30 percent chert fragments; very strongly acid; clear wavy boundary.

EB—19 to 22 inches; pale brown (10YR 6/3) and yellowish brown (10YR 5/6) very gravelly silt loam; weak very fine subangular blocky structure; very friable; few fine roots; about 30 percent chert fragments; extremely acid; abrupt wavy boundary.

2Ex—22 to 30 inches; mottled pale brown (10YR 6/3) and light brownish gray (10YR 6/2) extremely gravelly silt loam; weak very thin platy structure; firm; brittle; few very fine roots in polygonal cracks; about 70 percent chert fragments; very strongly acid; gradual wavy boundary.

2Bt1—30 to 39 inches; red (2.5YR 4/6) extremely gravelly silty clay; common medium prominent light brownish gray (10YR 6/2) and pale brown (10YR 6/3) mottles; moderate very fine angular blocky structure; firm; common faint clay films on faces of peds; about 70 percent chert fragments; very strongly acid; gradual smooth boundary.

2Bt2—39 to 60 inches; red (2.5YR 4/6) extremely gravelly clay; weak very fine angular blocky structure; firm; common faint clay films on faces of peds; about 70 percent chert fragments; strongly acid.

The depth to the fragipan ranges from 18 to 27 inches. The content of coarse fragments ranges from 0 to 15 percent in the A horizon, from 5 to 35 percent in the Bt horizon, and from 25 to 70 percent in the Ex, Btx, and 2Bt horizons.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. The Bt horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 3 to 6. It is silty clay loam, silt loam, or the gravelly analogs of those textures. The Ex or Btx horizon, if it occurs, is mottled and has hue of 10YR to 5YR, value of 4 to 6, and chroma of 1 to 6. It is the gravelly or extremely gravelly analogs of silt loam or silty clay loam. The 2Bt horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 3 to 6. It is the gravelly or extremely gravelly analogs of silty clay or clay.

Waben Series

The Waben series consists of very deep, well drained soils on stream terraces and alluvial fans. Permeability is moderately rapid. These soils formed in gravelly silty alluvium. Slopes range from 3 to 9 percent.

Typical pedon of Waben very gravelly silt loam, in an area of Waben-Cedargap very gravelly silt loams, 0 to 5 percent slopes; 2,210 feet south and 2,350 feet east of the northwest corner of sec. 5, T. 25 N., R. 25 W.

Ap—0 to 7 inches; dark brown (10YR 3/3) very gravelly silt loam, brown (10YR 5/3) dry; strong medium platy structure parting to weak fine granular; very friable; many fine roots; about 25 percent chert fragments; slightly acid; clear smooth boundary.

Bt1—7 to 27 inches; dark brown (7.5YR 4/4) very gravelly silty clay loam; weak very fine subangular blocky structure; friable; common very fine roots; few faint clay films on faces of peds; about 40 percent chert fragments; slightly acid; abrupt smooth boundary.

BC—27 to 42 inches; yellowish brown (10YR 5/4) extremely gravelly silt loam; weak very fine subangular blocky structure; very friable; few very fine roots; about 80 percent chert fragments; moderately acid; gradual wavy boundary.

C—42 to 60 inches; dark yellowish brown (10YR 4/4) very gravelly silt loam; massive; friable; about 55 percent chert fragments; strongly acid.

The content of coarse fragments ranges from 25 to 55 percent in the A and Bt horizons and from 50 to 80 percent in the BC and C horizons.

The A or Ap horizon has value of 3 or 4 and chroma of 2 or 3. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is the gravelly or very gravelly analogs of silt loam or silty clay loam. The BC horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is the very gravelly or extremely gravelly analogs of silt loam or silty clay loam.

Yelton Series

The Yelton series consists of very deep, moderately well drained soils on uplands and old high terraces. These soils have a fragipan. The permeability is moderate above the fragipan and slow in and below the fragipan. The soils formed in colluvium mixed with material weathered from sandstone, shale, or siltstone. Slopes range from 2 to 5 percent.

Typical pedon of Yelton loam, 2 to 5 percent slopes, eroded (fig. 19), 2,480 feet south and 2,200 feet west of the northeast corner of sec. 33, T. 22 N., R. 28 W.

Ap—0 to 3 inches; dark brown (10YR 3/3) loam, light gray (10YR 7/2) dry; weak fine granular structure; very friable; many fine roots; moderately acid; abrupt smooth boundary.

BE—3 to 8 inches; mixed yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and dark brown (10YR 3/3) loam; weak fine granular structure; very friable; common medium roots; moderately acid; clear smooth boundary.

Bt1—8 to 11 inches; yellowish brown (10YR 5/6) and

strong brown (7.5YR 5/8) clay loam; moderate fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—11 to 16 inches; yellowish brown (10YR 5/6 and 5/8) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; common prominent light gray sand coatings on vertical faces of peds; extremely acid; clear smooth boundary.

Bt3—16 to 20 inches; strong brown (7.5YR 5/6) clay loam; moderate medium platy structure parting to weak fine subangular blocky; friable; few fine roots; few faint clay films on faces of peds; common prominent light gray sand coatings on vertical faces of peds; extremely acid; clear smooth boundary.

Btx1—20 to 32 inches; brownish yellow (10YR 6/6) clay loam; common coarse prominent light gray (10YR 6/1) mottles; massive; very firm; brittle; few fine roots in polygonal cracks; few prominent red clay films on faces of peds; extremely acid; gradual smooth boundary.

Btx2—32 to 56 inches; yellowish red (5YR 5/6) clay loam; common coarse prominent pinkish gray (7.5YR 7/2) mottles; massive; very firm; brittle; common faint red (2.5YR 5/6) clay films on faces of peds; very strongly acid; gradual smooth boundary.

Btx3—56 to 60 inches; mottled gray (10YR 5/1) and pinkish gray (7.5YR 7/2) very channery clay loam; massive; very firm; brittle; common prominent red clay films on faces of peds; about 40 percent sandstone fragments; very strongly acid.

The depth to the fragipan ranges from 20 to 27 inches. The content of coarse fragments ranges from 0 to 10 percent in the A horizon, the Bt horizon, and the upper part of the Btx horizon and from 10 to 50 percent in the lower part of the Btx horizon.

The A or Ap horizon has value of 3 to 5 and chroma of 2 to 4. The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 8. It is clay loam or loam. The Btx horizon is mottled and has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 2 to 8. It is clay loam, loam, or the channery or very channery analogs of those textures.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon. Commonly, such soils formed in recent alluvium or on steep rocky slopes.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100

grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after

a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 60 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The

slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grain material, dominantly of silt-sized particles, deposited by the wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grain soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size

of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic

criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 1 percent
Nearly level and very gently sloping	0 to 3 percent
Very gently sloping	1 to 3 percent
Gently sloping	2 to 5 percent
Moderately sloping	5 to 9 percent
Strongly sloping	9 to 14 percent
Moderately steep	14 to 20 percent
Steep	20 to 35 percent
Very steep	35 percent or more

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediments of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grain particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-86 at Cassville, Missouri)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	42.4	18.2	30.3	71	20	14	1.77	0.60	2.73	4	2.1
February	47.3	22.5	34.9	73	20	9	2.35	1.08	3.43	5	3.8
March	58.0	33.1	45.6	82	7	68	3.81	1.98	5.40	7	1.9
April	69.3	43.7	56.5	87	23	220	4.50	2.84	6.00	7	.2
May	75.7	51.4	63.6	88	31	422	4.93	2.78	6.83	8	.0
June	83.9	60.8	72.4	94	42	672	4.83	1.87	7.30	7	.0
July	89.5	64.7	77.1	101	47	840	3.49	1.32	5.30	5	.0
August	88.4	62.2	75.3	100	47	784	3.61	1.60	5.31	5	.0
September	80.6	55.9	68.3	95	33	549	3.90	1.54	5.88	6	.0
October	70.8	43.1	57.0	88	23	234	3.62	1.46	5.46	5	.0
November	57.4	33.1	45.3	81	8	39	3.53	1.36	5.33	5	.8
December	46.7	23.6	35.2	72	8	20	2.84	1.21	4.22	5	1.5
Yearly:											
Average	67.5	42.7	55.1	---	---	---	---	---	---	---	---
Extreme	---	---	---	103	8	---	---	---	---	---	---
Total	---	---	---	---	---	3,871	43.18	35.24	50.41	69	10.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-86 at Cassville, Missouri)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 11	Apr. 24	May 9
2 years in 10 later than--	Apr. 7	Apr. 20	May 5
5 years in 10 later than--	Mar. 30	Apr. 10	Apr. 26
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 22	Oct. 7	Sept. 25
2 years in 10 earlier than--	Oct. 28	Oct. 13	Sept. 30
5 years in 10 earlier than--	Nov. 8	Oct. 23	Oct. 10

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-86 at Cassville, Missouri)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	203	175	151
8 years in 10	210	182	156
5 years in 10	222	195	166
2 years in 10	236	209	177
1 year in 10	244	217	183

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
11B	Pembroke silt loam, 1 to 3 percent slopes	690	0.1
15C	Scholten gravelly silt loam, 3 to 9 percent slopes	62,500	12.3
16B	Creldon silt loam, 1 to 3 percent slopes	660	0.1
18B	Captina silt loam, 1 to 3 percent slopes	4,700	0.9
19B	Needleye silt loam, 1 to 3 percent slopes	410	0.1
20B	Branson silt loam, 1 to 3 percent slopes	3,500	0.7
21B	Claiborne silt loam, 2 to 5 percent slopes	5,600	1.1
22B	Britwater gravelly silt loam, 2 to 5 percent slopes	8,700	1.7
23B	Lily-Ramsey complex, 2 to 5 percent slopes	2,300	0.5
24A	Parsons-Barden-Carytown silt loams, 0 to 3 percent slopes	810	0.2
26B2	Yelton loam, 2 to 5 percent slopes, eroded	2,400	0.5
27E	Beemont cobbly very fine sandy loam, 5 to 20 percent slopes, extremely stony	3,850	0.8
28C	Beemont loam, 3 to 9 percent slopes	940	0.2
29C	Portia fine sandy loam, 3 to 9 percent slopes	340	0.1
30C	Keeno very gravelly silt loam, 3 to 9 percent slopes	860	0.2
31C	Waben very gravelly silt loam, 3 to 9 percent slopes	2,250	0.4
35D	Hailey-Nixa very gravelly silt loams, 5 to 14 percent slopes	22,000	4.3
36D	Nixa-Clarksville very gravelly silt loams, 5 to 14 percent slopes	13,700	2.7
40D	Noark-Clarksville very gravelly silt loams, 5 to 14 percent slopes	19,900	3.9
41E	Noark very gravelly silt loam, 9 to 20 percent slopes	15,000	3.0
44G	Hailey-Rock outcrop-Moko complex, 35 to 60 percent slopes	51,000	10.1
45F	Clarksville very gravelly silt loam, 14 to 35 percent slopes	32,250	6.4
46G	Clarksville-Rock outcrop-Moko complex, 35 to 60 percent slopes	18,600	3.7
50C	Nixa very gravelly silt loam, 3 to 9 percent slopes	8,100	1.6
51B	Tonti-Scholten complex, 2 to 6 percent slopes	51,500	10.2
54	Dunning silt loam, overwashed	440	0.1
55	Elk-Huntington silt loams	3,200	0.6
61B	Hoberg silt loam, 2 to 5 percent slopes	2,450	0.5
76	Racoon silt loam	1,400	0.3
81B	Tonti silt loam, 1 to 3 percent slopes	15,600	3.1
82B	Rock outcrop-Lithic Udorthents complex, 2 to 5 percent slopes	105	*
83F	Moko-Rock outcrop complex, 5 to 50 percent slopes	7,300	1.4
83G	Rock outcrop-Moko complex, 50 to 95 percent slopes	880	0.2
84D	Bardley-Moko-Rock outcrop complex, 5 to 14 percent slopes	5,700	1.1
85D	Moko-Rock outcrop-Blueye complex, 5 to 14 percent slopes	5,200	1.0
85F	Moko-Blueye-Rock outcrop complex, 14 to 50 percent slopes	24,250	4.8
86D	Mano-Gatewood very gravelly silt loams, 5 to 14 percent slopes, extremely stony	11,500	2.3
86F	Mano-Ocie extremely gravelly silt loams, 14 to 50 percent slopes, extremely stony	11,400	2.2
87F	Moko-Snead-Rock outcrop complex, 14 to 50 percent slopes	2,350	0.5
88D	Blueye-Moko complex, 5 to 14 percent slopes	1,650	0.3
89D	Mano-Ocie very gravelly silt loams, 5 to 14 percent slopes	16,600	3.3
89F	Mano-Ocie very gravelly silt loams, 14 to 50 percent slopes	8,700	1.7
91B	Viraton silt loam, 2 to 5 percent slopes	1,550	0.3
92A	Secesh silt loam, 0 to 3 percent slopes	20,250	4.0
93B	Waben-Cedargap very gravelly silt loams, 0 to 5 percent slopes	14,700	2.9
94B	Hercules very gravelly silty clay loam, 1 to 5 percent slopes	7,056	1.4
96	Pits-Dumps complex	115	*
	Water	10,945	2.2
	Total	505,901	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
11B	Pembroke silt loam, 1 to 3 percent slopes
16B	Creldon silt loam, 1 to 3 percent slopes
18B	Captina silt loam, 1 to 3 percent slopes
19B	Needleye silt loam, 1 to 3 percent slopes
20B	Branson silt loam, 1 to 3 percent slopes
21B	Claiborne silt loam, 2 to 5 percent slopes
22B	Britwater gravelly silt loam, 2 to 5 percent slopes
29C	Portia fine sandy loam, 3 to 9 percent slopes
54	Dunning silt loam, overwashed (where drained and either protected from flooding or not frequently flooded during the growing season)
55	Elk-Huntington silt loams (where protected from flooding or not frequently flooded during the growing season)
76	Racoon silt loam (where drained)
92A	Secesh silt loam, 0 to 3 percent slopes

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Grain sorghum	Winter wheat	Alfalfa hay	Tall fescue hay	Tall fescue	Switchgrass	Improved bermudagrass
		Bu	Bu	Tons	Tons	AUM*	AUM*	AUM*
11B---------- Pembroke	IIe	98	46	5.0	4.3	6.5	8.0	9.0
15C---------- Scholten	IVs	59	27	3.0	2.5	3.8	5.0	---
16B---------- Creldon	IIe	71	33	4.0	3.1	4.7	6.0	6.5
18B---------- Captina	IIe	79	37	4.2	3.4	5.1	6.5	7.0
19B---------- Needleye	IIe	75	35	4.1	3.2	4.8	6.2	6.7
20B---------- Branson	IIe	85	40	4.6	3.7	5.6	7.3	7.8
21B---------- Claiborne	IIe	75	34	4.1	3.2	4.8	6.2	6.7
22B---------- Britwater	IIIe	80	37	4.2	3.4	5.1	6.8	7.2
23B**---------- Lily-Ramsey	VIe	---	---	---	1.8	2.6	3.5	---
24A**---------- Parsons-Barden-Carytown	IIIe	77	37	---	3.3	4.9	6.5	---
26B2---------- Yelton	IIIe	60	28	---	2.6	3.9	5.0	---
27E---------- Beemont	VIIe	---	---	---	---	3.0	3.5	---
28C---------- Beemont	IVe	59	27	---	2.5	3.8	5.0	---
29C---------- Portia	IIIe	83	38	---	3.5	5.3	6.8	7.5
30C---------- Keeno	IVs	---	---	---	1.7	2.6	3.5	4.0
31C---------- Waben	IIIs	50	24	---	2.2	3.3	4.3	---
35D**---------- Hailey-Nixa	VIe	---	---	---	1.5	2.3	3.0	---
36D**---------- Nixa-Clarksville	VIe	---	---	---	1.3	2.0	2.5	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Grain sorghum	Winter wheat	Alfalfa hay	Tall fescue hay	Tall fescue	Switchgrass	Improved bermudagrass
		Bu	Bu	Tons	Tons	AUM*	AUM*	AUM*
40D**---------- Noark-Clarksville	VIe	---	---	---	1.8	2.7	3.5	---
41E---------- Noark	VIe	---	---	---	1.8	2.7	3.5	---
44G**---------- Hailey-Rock outcrop-Moko	VIIe	---	---	---	---	1.9	2.0	---
45F---------- Clarksville	VIIe	---	---	---	---	2.0	---	---
46G**---------- Clarksville-Rock outcrop-Moko	VIIe	---	---	---	---	1.5	---	---
50C---------- Nixa	IVs	---	---	---	1.5	2.3	2.8	---
51B**---------- Tonti-Scholten	IIIe	47	22	---	2.0	3.0	4.0	---
54---------- Dunning	IIIw	80	37	---	3.4	5.1	7.0	7.5
55**---------- Elk-Huntington	IIw	85	39	---	3.7	5.6	7.5	8.0
61B---------- Hoberg	IIIe	70	33	---	3.1	4.7	6.2	6.7
76---------- Racoon	IIIw	80	37	---	3.4	5.1	7.0	7.5
81B---------- Tonti	IIe	54	26	---	2.4	3.6	5.0	5.5
82B**---------- Rock outcrop-Lithic Udorthents	VIII	---	---	---	---	0.7	---	---
83F**---------- Moko-Rock outcrop	VIIs	---	---	---	---	---	1.0	---
83G**---------- Rock outcrop-Moko	VIIs	---	---	---	---	---	1.0	---
84D**---------- Bardley-Moko-Rock outcrop	VIe	---	---	---	---	---	1.5	---
85D**---------- Moko-Rock outcrop-Blueye	VIIe	---	---	---	---	---	1.5	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Grain sorghum	Winter wheat	Alfalfa hay	Tall fescue hay	Tall fescue	Switchgrass	Improved bermudagrass
		Bu	Bu	Tons	Tons	AUM*	AUM*	AUM*
85F**---------- Moko-Blueye- Rock outcrop	VIIe	---	---	---	---	1.0	1.5	---
86D**---------- Mano-Gatewood	VIIs	---	---	---	---	1.5	2.0	---
86F**---------- Mano-Ocie	VIIs	---	---	---	---	1.5	2.0	---
87F**---------- Moko-Snead- Rock outcrop	VIIe	---	---	---	---	1.0	1.5	---
88D**---------- Blueye-Moko	VIe	---	---	---	---	1.0	1.5	---
89D**---------- Mano-Ocie	VIe	---	---	---	---	2.0	2.5	---
89F**---------- Mano-Ocie	VIIe	---	---	---	---	1.8	2.2	---
91B---------- Viraton	IIIe	60	26	---	2.5	3.6	5.0	---
92A---------- Secesh	IIs	88	40	---	3.9	5.9	8.0	8.5
93B**---------- Waben-Cedargap	IIIw	---	25	3.8	2.5	3.8	6.0	6.5
94B---------- Hercules	IIIs	---	25	3.0	2.5	3.6	5.0	---
96**. Pits-Dumps								

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for the production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
11B Pembroke	4A	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Hickory Black walnut White ash	85 --- --- --- ---	67 --- --- --- ---	Black walnut, white ash, eastern white pine, shortleaf pine, northern red oak, white oak.
15C Scholten	2D	Slight	Slight	Moderate	Moderate	Post oak Black oak Hickory	45 45 ---	30 30 ---	Black oak, eastern redcedar, shortleaf pine.
18B Captina	3D	Slight	Slight	Slight	Moderate	Black oak Post oak Blackjack oak	59 51 ---	42 35 ---	Black oak, shortleaf pine.
19B Needleye	3D	Slight	Slight	Moderate	Moderate	Black oak Post oak Blackjack oak	60 --- ---	43 --- ---	Black oak, pin oak, white ash.
20B Branson	4A	Slight	Slight	Slight	Slight	Northern red oak White oak	70 66	52 48	Black walnut, white oak, shortleaf pine.
21B Claiborne	4A	Slight	Slight	Slight	Slight	Shortleaf pine White oak Black oak	66 66 66	100 52 52	White oak, black walnut, shortleaf red oak.
22B Britwater	3A	Slight	Slight	Slight	Slight	Shortleaf pine Northern red oak Eastern redcedar	70 66 ---	110 48 ---	Shortleaf pine, northern red oak, eastern redcedar, white oak.
23B**: Lily	3A	Slight	Slight	Slight	Slight	Black oak Post oak White ash Northern red oak White oak	58 --- --- 54 ---	41 --- --- 38 ---	Shortleaf pine, northern red oak, white oak.
Ramsey	2D	Slight	Slight	Moderate	Severe	Northern red oak White oak Eastern redcedar	60 61 ---	34 32 ---	Shortleaf pine.
26B2 Yelton	3D	Slight	Slight	Moderate	Severe	White oak Black oak	55 ---	38 ---	Shortleaf pine, white oak, black oak.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
27E---- Beemont	2X	Slight	Severe	Moderate	Moderate	White oak	45	30	Eastern redcedar, shortleaf pine.
						Eastern redcedar	---	---	
						Post oak	---	---	
28C---- Beemont	2C	Slight	Slight	Moderate	Moderate	White oak	48	30	Eastern redcedar, northern red oak, shortleaf pine.
						Eastern redcedar	---	---	
						Post oak	---	---	
						Northern red oak	61	44	
29C---- Portia	3A	Slight	Slight	Slight	Slight	Northern red oak	65	48	Shortleaf pine, northern red oak, white oak.
						Shortleaf pine	72	114	
31C---- Waben	3F	Slight	Slight	Moderate	Slight	White oak	66	31	Shortleaf pine, white oak, northern red oak.
						Shortleaf pine	70	110	
						Northern red oak	66	52	
						Eastern redcedar	---	---	
						Black walnut	---	---	
						Black oak	71	53	
35D**:									
Hailey----	3F	Slight	Slight	Severe	Slight	White oak	58	41	White oak, shortleaf pine.
						Northern red oak	61	44	
						Blackjack oak	---	---	
						Post oak	---	---	
						Hickory	---	---	
Nixa----	3D	Slight	Slight	Moderate	Moderate	Black oak	63	46	Black oak, white ash.
						Blackjack oak	---	---	
						Post oak	---	---	
						Hickory	---	---	
36D**:									
Nixa----	3D	Slight	Slight	Moderate	Moderate	Black oak	63	46	Black oak, white ash.
						Blackjack oak	---	---	
						Post oak	---	---	
						Hickory	---	---	
Clarksville----	3F	Slight	Slight	Moderate	Slight	White oak	55	38	White oak, shortleaf pine.
						Shortleaf pine	58	41	
						Black oak	62	45	
						Northern red oak	58	41	
40D**:									
Noark----	3F	Slight	Slight	Moderate	Slight	White oak	64	47	Shortleaf pine eastern redcedar, northern red oak, black oak, white oak.
						Shortleaf pine	60	88	
						Eastern redcedar	40	43	
						Northern red oak	66	48	
						Black oak	67	48	
Clarksville----	3F	Slight	Slight	Moderate	Slight	White oak	55	38	White oak, shortleaf pine.
						Shortleaf pine	58	41	
						Black oak	62	45	
						Northern red oak	58	41	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
41E---------- Noark	3F	Slight	Slight	Moderate	Slight	White oak----------	64	41	Shortleaf pine, eastern redcedar, northern red oak, black oak, white oak.
						Shortleaf pine------	60	88	
						Eastern redcedar----	40	43	
						Northern red oak----	66	48	
						Black oak----------	67	48	
44G**:									
Hailey---------	3R	Severe	Severe	Severe	Slight	White oak----------	58	41	White oak, shortleaf pine.
						Northern red oak----	61	48	
						Blackjack oak-------	---	---	
						Post oak-----------	---	---	
						Hickory------------	---	---	
Rock outcrop.									
Moko----------	2R	Severe	Severe	Moderate	Severe	Eastern redcedar----	30	32	Eastern redcedar.
45F---------- Clarksville	3R	Moderate	Moderate	Moderate	Slight	White oak----------	55	38	White oak, shortleaf pine.
						Shortleaf pine------	58	41	
						Black oak----------	62	45	
						Northern red oak----	58	46	
46G**:									
Clarksville----	3R	Severe	Severe	Moderate	Slight	White oak----------	55	38	White oak, shortleaf pine.
						Shortleaf pine------	58	41	
						Black oak----------	62	45	
						Northern red oak----	58	41	
Rock outcrop.									
Moko----------	2R	Severe	Severe	Moderate	Severe	Eastern redcedar----	30	32	Eastern redcedar.
50C---------- Nixa	3D	Slight	Slight	Moderate	Moderate	Black oak----------	63	46	Black oak, white ash, black locust.
						Blackjack oak-------	---	---	
						Post oak-----------	---	---	
						Hickory------------	---	---	
51B**:									
Tonti----------	4D	Slight	Slight	Slight	Moderate	Black oak----------	70	52	Black oak, black locust, white ash, shortleaf pine.
						Post oak-----------	---	---	
Scholten-------	2D	Slight	Slight	Moderate	Moderate	Post oak-----------	45	30	Black oak, shortleaf pine.
						Black oak----------	45	30	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
54--Dunning	5W	Slight	Severe	Severe	Severe	Pin oak	95	77	Pin oak, American sycamore, baldcypress, swamp white oak, sweetgum.
						Eastern cottonwood	100	128	
						American sycamore	---	---	
						Boxelder	---	---	
						Black willow	---	---	
						Swamp white oak	---	---	
55**:									
Elk	5A	Slight	Slight	Slight	Slight	Northern red oak	85	65	Eastern white pine, black walnut, loblolly pine, white oak, northern red oak, white ash, shortleaf pine.
						Pin oak	96	78	
						Red maple	---	---	
						American sycamore	---	---	
						Black walnut	---	---	
Huntington	5A	Slight	Slight	Slight	Slight	Northern red oak	85	67	Yellow poplar, black walnut, white oak, northern red oak.
76--Racoon	4W	Slight	Severe	Moderate	Severe	Pin oak	80	62	Baldcypress, pin oak, water tupelo, red maple.
						Post oak	80	62	
						Green ash	---	---	
						White oak	---	---	
81B--Tonti	4D	Slight	Slight	Slight	Moderate	Black oak	70	52	Black oak, white ash, shortleaf pine.
						Post oak	---	---	
83F**:									
Moko	2R	Moderate	Moderate	Moderate	Severe	Eastern redcedar	30	32	Eastern redcedar.
Rock outcrop.									
83G**:									
Rock outcrop.									
Moko	2R	Severe	Severe	Moderate	Severe	Eastern redcedar	30	32	Eastern redcedar.
84D**:									
Bardley	2D	Slight	Slight	Moderate	Moderate	Post oak	42	30	White oak, black oak, shortleaf pine, eastern redcedar.
						White oak	42	28	
						Black oak	54	38	
Moko	2X	Slight	Moderate	Moderate	Severe	Eastern redcedar	30	32	Eastern redcedar.
Rock outcrop.									

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
85D**:									
Moko	2X	Slight	Moderate	Moderate	Severe	Eastern redcedar	30	32	Eastern redcedar.
Rock outcrop.									
Blueye	2A	Slight	Slight	Slight	Slight	Eastern redcedar	35	37	Eastern redcedar.
						Blackjack oak	---	---	
						Post oak	---	---	
85F**:									
Moko	2R	Moderate	Moderate	Moderate	Severe	Eastern redcedar	30	32	Eastern redcedar.
Blueye	2R	Moderate	Moderate	Slight	Slight	Eastern redcedar	35	37	Eastern redcedar.
						Blackjack oak	---	---	
						Post oak	---	---	
Rock outcrop.									
86D**:									
Mano	3X	Slight	Moderate	Moderate	Slight	White oak	58	41	Northern red oak, shortleaf pine.
						Black oak	58	41	
						Northern red oak	---	---	
Gatewood	2X	Slight	Moderate	Slight	Slight	White oak	45	30	Eastern redcedar, shortleaf pine.
						Chinkapin oak	---	---	
						Eastern redcedar	---	---	
						White ash	---	---	
86F**:									
Mano	3R	Moderate	Moderate	Moderate	Slight	White oak	58	41	Northern red oak, shortleaf pine.
						Black oak	58	41	
						Northern red oak	---	---	
Ocie	3R	Moderate	Moderate	Moderate	Slight	White oak	57	40	Northern red oak, shortleaf pine.
						Black oak	59	42	
						Northern red oak	---	---	
87F**:									
Moko	2R	Moderate	Moderate	Moderate	Severe	Eastern redcedar	30	32	Eastern redcedar.
Snead	3R	Moderate	Moderate	Severe	Severe	Northern red oak	64	47	White ash, shortleaf pine, northern red oak.
						White oak	48	38	
						White ash	63	39	
						Sugar maple	---	---	
Rock outcrop.									
88D**:									
Blueye	2A	Slight	Slight	Slight	Slight	Eastern redcedar	35	37	Eastern redcedar.
						Blackjack oak	---	---	
						Post oak	---	---	
Moko	2X	Slight	Moderate	Moderate	Severe	Eastern redcedar	30	32	Eastern redcedar.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
89D**:									
Mano	3F	Slight	Slight	Moderate	Slight	White oak	58	41	Northern red oak, shortleaf pine.
						Black oak	63	41	
						Northern red oak	---	---	
Ocie	3F	Slight	Slight	Moderate	Slight	White oak	57	41	Northern red oak, shortleaf pine.
						Black oak	58	41	
						Northern red oak	---	---	
89F**:									
Mano	3R	Moderate	Moderate	Moderate	Slight	White oak	58	41	Northern red oak, shortleaf pine.
						Black oak	63	41	
						Northern red oak	---	---	
Ocie	3R	Moderate	Moderate	Moderate	Slight	White oak	57	41	Northern red oak, shortleaf pine.
						Black oak	58	41	
						Northern red oak	---	---	
91B Viraton	3D	Slight	Slight	Moderate	Moderate	Black oak	62	45	White oak, black oak, shortleaf pine.
						White oak	52	38	
						Shortleaf pine	---	---	
92A Secesh	3A	Slight	Slight	Slight	Slight	White oak	60	43	Black walnut, shortleaf pine, American sycamore.
						Shortleaf pine	---	---	
						American sycamore	---	---	
						Black walnut	---	---	
						Black oak	---	---	
93B**:									
Waben	3F	Slight	Slight	Moderate	Slight	White oak	66	43	Shortleaf pine, black walnut, black oak.
						Shortleaf pine	70	110	
						Northern red oak	66	48	
						Eastern redcedar	---	---	
						Black walnut	---	---	
						Black oak	71	53	
Cedargap	3F	Slight	Slight	Moderate	Slight	Black oak	66	48	Black oak, black walnut, northern red oak.
						Black walnut	---	---	
						Green ash	---	---	
94B Hercules	3F	Slight	Slight	Moderate	Slight	Black oak	66	48	Black oak, black walnut, northern red oak.
						American sycamore	65	53	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
11B---------- Pembroke	---	Amur honeysuckle, lilac, Amur maple, gray dogwood.	Eastern redcedar, Russian-olive, hackberry.	Norway spruce, green ash, honeylocust, pin oak, eastern white pine.	---
15C---------- Scholten	Lilac----------	Manchurian crabapple, Amur honeysuckle, Amur maple.	Austrian pine, hackberry, eastern redcedar, green ash, Russian-olive	Honeylocust-------	---
16B---------- Creldon	Lilac----------	Amur honeysuckle, Amur maple, Manchurian crabapple.	Russian-olive, Austrian pine, eastern redcedar, hackberry, green ash.	Honeylocust-------	---
18B---------- Captina	Lilac----------	Amur honeysuckle, Amur maple, Manchurian crabapple.	Russian-olive, Austrian pine, eastern redcedar, hackberry, green ash.	Honeylocust-------	---
19B---------- Needleye	Lilac----------	Amur honeysuckle, Amur maple, gray dogwood, Manchurian crabapple.	Russian-olive, Austrian pine, eastern redcedar, red pine, hackberry, green ash.	Honeylocust-------	---
20B---------- Branson	---	Lilac, Amur maple, Amur honeysuckle, gray dogwood.	Eastern redcedar, Russian-olive, hackberry.	Green ash, honeylocust, pin oak, Norway spruce, eastern white pine.	---
21B---------- Claiborne	---	Amur honeysuckle, lilac, gray dogwood.	Eastern redcedar, Russian-olive, hackberry.	Norway spruce, green ash, honeylocust, pin oak, eastern white pine.	---
22B---------- Britwater	Amur honeysuckle, fragrant sumac, lilac.	Washington hawthorn, Nanking cherry.	Russian-olive, eastern redcedar, hackberry, bur oak, green ash, Austrian pine, honeylocust.	Siberian elm------	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
23B*: Lily---------- Ramsey.	Fragrant sumac, lilac, Amur honeysuckle.	Washington hawthorn, Nanking cherry.	Russian-olive, bur oak, hackberry, green ash, eastern redcedar, Austrian pine.	Honeylocust, Siberian elm.	---
24A*: Parsons----------	Peking cotoneaster, lilac.	Amur honeysuckle, Siberian peashrub, Manchurian crabapple.	Eastern redcedar, Austrian pine, green ash, Russian-olive, hackberry.	Honeylocust, Siberian elm.	---
Barden----------	Lilac----------	Amur honeysuckle, Manchurian crabapple, Amur maple.	Eastern redcedar, Austrian pine, Russian-olive, green ash, hackberry.	Honeylocust-------	---
Carytown---------	Amur honeysuckle, lilac, silver buffaloberry.	Eastern redcedar, Siberian peashrub.	Green ash, Russian-olive.	Siberian elm, golden willow, white willow.	Eastern cottonwood.
26B2---------- Yelton	Lilac----------	Amur honeysuckle, Amur maple, Manchurian crabapple.	Hackberry, Russian-olive, Austrian pine, green ash, eastern redcedar.	Honeylocust-------	---
27E---------- Beemont	Lilac----------	Amur honeysuckle, Amur maple, Manchurian crabapple. eastern redcedar.	Russian-olive, Austrian pine, hackberry, green ash.	Honeylocust-------	---
28C---------- Beemont	Lilac----------	Amur honeysuckle, Amur maple, gray dogwood, Manchurian crabapple.	Russian-olive, Austrian pine, eastern redcedar, hackberry, green ash.	Honeylocust-------	---
29C. Portia					
30C---------- Keeno	Amur honeysuckle, fragrant sumac, lilac.	Gray dogwood------	Russian-olive, Austrian pine, eastern redcedar, bur oak, hackberry, green ash, honeylocust.	Siberian elm------	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
31C---------- Waben	Amur honeysuckle, fragrant sumac, lilac.	Washington hawthorn, Nanking cherry.	Russian-olive, eastern redcedar, hackberry, bur oak, green ash, Austrian pine, honeylocust.	Siberian elm------	---
35D*:					
Hailey----------	Fragrant sumac, Amur honeysuckle, lilac.	Washington hawthorn, Nanking cherry.	Russian-olive, eastern redcedar, green ash, hackberry, bur oak, Austrian pine, honeylocust.	Siberian elm------	---
Nixa----------	Amur honeysuckle, fragrant sumac, lilac.	Washington hawthorn, Nanking cherry.	Russian-olive, Austrian pine, eastern redcedar, bur oak, hackberry, green ash, honeylocust.	Siberian elm------	---
36D*:					
Nixa----------	Amur honeysuckle, fragrant sumac, lilac.	Washington hawthorn, Nanking cherry.	Russian-olive, Austrian pine, eastern redcedar, bur oak, hackberry, green ash, honeylocust.	Siberian elm------	---
Clarksville------	Amur honeysuckle, lilac, fragrant sumac.	Washington hawthorn, Nanking cherry.	Eastern redcedar, Austrian pine, honeylocust, hackberry, green ash, bur oak, Russian-olive.	Siberian elm------	---
40D*:					
Noark.					
Clarksville------	Amur honeysuckle, lilac, fragrant sumac.	Washington hawthorn, Nanking cherry.	Eastern redcedar, Austrian pine, honeylocust, hackberry, green ash, bur oak, Russian-olive.	Siberian elm------	---
41E.					
Noark					
44G*:					
Hailey----------	Fragrant sumac, Amur honeysuckle, lilac.	Washington hawthorn, Nanking cherry.	Russian-olive, eastern redcedar, green ash, hackberry, bur oak, Austrian pine, honeylocust.	Siberian elm------	---
Rock outcrop.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
44G*: Moko.					
45F---------- Clarksville	Amur honeysuckle, lilac, fragrant sumac.	Washington hawthorn, Nanking cherry.	Eastern redcedar, Austrian pine, honeylocust, hackberry, green ash, bur oak, Russian-olive.	Siberian elm------	---
46G*: Clarksville------	Amur honeysuckle, lilac, fragrant sumac.	Washington hawthorn, Nanking cherry.	Eastern redcedar, Austrian pine, honeylocust, hackberry, green ash, bur oak, Russian-olive.	Siberian elm------	---
Rock outcrop.					
Moko.					
50C---------- Nixa	Amur honeysuckle, fragrant sumac, lilac.	Washington hawthorn, Nanking cherry.	Russian-olive, Austrian pine, eastern redcedar, bur oak, hackberry, green ash, honeylocust.	Siberian elm------	---
51B*: Tonti----------	Lilac----------	Amur honeysuckle, Amur maple, Manchurian crabapple.	Russian-olive, Austrian pine, eastern redcedar, hackberry, green ash.	Honeylocust-------	---
Scholten---------	Lilac----------	Manchurian crabapple, Amur honeysuckle, Amur maple.	Austrian pine, hackberry, eastern redcedar, green ash, Russian-olive.	Honeylocust-------	---
54---------- Dunning	Redosier dogwood	American plum, common chokecherry.	Eastern redcedar, hackberry.	Green ash, northern red oak, Norway spruce, honeylocust, silver maple.	Eastern cottonwood.
55*: Elk----------	---	Amur honeysuckle, Amur maple, possumhaw.	Eastern redcedar, black walnut, Virginia pine.	Green ash, shortleaf pine, cherrybark oak, loblolly pine.	Yellow poplar.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
55*:					
Huntington	---	Amur honeysuckle, lilac, Amur maple, gray dogwood.	Eastern redcedar	Austrian pine, hackberry, green ash, pin oak, honeylocust, eastern white pine.	Eastern cottonwood.
61B Hoberg	Lilac	Amur honeysuckle, Amur maple, gray dogwood, Manchurian crabapple.	Russian-olive, Austrian pine, eastern redcedar, red pine, hackberry, green ash.	Honeylocust	---
76 Racoon	Redosier dogwood	American plum, common chokecherry.	Eastern redcedar, hackberry.	Norway spruce, golden willow, northern red oak, green ash, honeylocust, silver maple.	Eastern cottonwood.
81B Tonti	Lilac	Amur honeysuckle, Amur maple, Manchurian crabapple.	Russian-olive, Austrian pine, eastern redcedar, hackberry, green ash.	Honeylocust	---
82B*:					
Rock outcrop.					
Lithic Udorthents.					
83F*:					
Moko.					
Rock outcrop.					
83G*:					
Rock outcrop.					
Moko.					
84D*:					
Bardley	Lilac, fragrant sumac, Amur honeysuckle.	Washington hawthorn, Nanking cherry.	Russian-olive, hackberry, eastern redcedar, bur oak, green ash, Austrian pine, honeylocust.	Siberian elm	---
Moko.					
Rock outcrop.					
85D*:					
Moko.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
85D*:					
Rock outcrop.					
Blueye	Amur honeysuckle, fragrant sumac, lilac.	Gray dogwood	Russian-olive, Austrian pine, eastern redcedar, bur oak, hackberry, green ash.	Honeylocust, Siberian elm.	---
85F*:					
Moko.					
Blueye	Amur honeysuckle, fragrant sumac, lilac.	Gray dogwood	Russian-olive, Austrian pine, eastern redcedar, bur oak, hackberry, green ash.	Honeylocust, Siberian elm.	---
Rock outcrop.					
86D*:					
Mano	Lilac	Amur honeysuckle, Manchurian crabapple, Amur maple.	Russian-olive, green ash, eastern redcedar, hackberry, Austrian pine, shortleaf pine.	Honeylocust	---
Gatewood	Amur honeysuckle, fragrant sumac.	Gray dogwood	Lilac, Russian-olive, eastern redcedar, hackberry, bur oak, green ash, Austrian pine.	Honeylocust, Siberian elm.	---
86F*:					
Mano	Lilac	Amur honeysuckle, Manchurian crabapple, Amur maple.	Russian-olive, green ash, eastern redcedar, hackberry, Austrian pine, shortleaf pine.	Honeylocust	---
Ocie	Lilac, Amur honeysuckle, fragrant sumac.	Gray dogwood	Russian-olive, green ash, honeylocust, bur oak, eastern redcedar, hackberry, Austrian pine.	Siberian elm	---
87F*:					
Moko.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
87F*:					
Snead	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, American cranberrybush.	Bur oak, Austrian pine, green ash, Osageorange.	Eastern white pine	---
Rock outcrop.					
88D*:					
Blueye	Amur honeysuckle, fragrant sumac, lilac.	Gray dogwood	Russian-olive, Austrian pine, eastern redcedar, bur oak, hackberry, green ash.	Honeylocust, Siberian elm.	---
Moko.					
89D*, 89F*:					
Mano	Lilac	Gray dogwood, Amur honeysuckle, Manchurian crabapple, Amur maple.	Russian-olive, green ash, eastern redcedar, hackberry, Austrian pine.	Honeylocust	---
Ocie	Lilac, Amur honeysuckle, fragrant sumac.	Gray dogwood	Russian-olive, green ash, honeylocust, bur oak, eastern redcedar, hackberry, Austrian pine.	Siberian elm	---
91B Viraton	Lilac	Manchurian crabapple, Amur honeysuckle, Amur maple.	Eastern redcedar, Austrian pine, hackberry, green ash, Russian-olive.	Honeylocust	---
92A Secesh	---	Gray dogwood, Amur honeysuckle, Amur maple, lilac.	Eastern redcedar	Austrian pine, honeylocust, pin oak, eastern white pine, hackberry, green ash.	Eastern cottonwood.
93B*:					
Waben	Amur honeysuckle, fragrant sumac, lilac.	Washington hawthorn, Nanking cherry.	Russian-olive, eastern redcedar, hackberry, bur oak, green ash, Austrian pine, honeylocust.	Siberian elm	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
93B*: Cedargap	---	Amur maple, Amur honeysuckle, gray dogwood, lilac.	Eastern redcedar	Hackberry, Austrian pine, eastern white pine, green ash, honeylocust, pin oak.	Eastern cottonwood.
94B Hercules	---	Amur honeysuckle, gray dogwood, lilac, Amur maple.	Eastern redcedar	Green ash, Austrian pine, honeylocust, hackberry, eastern white pine, pin oak.	Eastern cottonwood.
96*: Pits.					
Dumps.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
11B Pembroke	Slight	Slight	Moderate: slope.	Slight	Slight.
15C Scholten	Severe: small stones, percs slowly.	Severe: small stones, percs slowly.	Severe: slope, small stones, percs slowly.	Moderate: wetness.	Severe: small stones.
16B Creldon	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
18B Captina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
19B Needleye	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.
20B Branson	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
21B Claiborne	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
22B Britwater	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
23B*: Lily	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight	Moderate: depth to rock.
Ramsey	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Severe: depth to rock.
24A*: Parsons	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Barden	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
Carytown	Severe: wetness, percs slowly, excess sodium.	Severe: wetness, excess sodium, percs slowly.	Severe: wetness, percs slowly, excess sodium.	Severe: wetness.	Severe: excess sodium, wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
26B2 Yelton	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Severe: erodes easily.	Moderate: wetness, droughty.
27E Beemont	Severe: small stones, percs slowly.	Severe: small stones, percs slowly.	Severe: large stones, slope, small stones.	Severe: small stones.	Severe: small stones, large stones.
28C Beemont	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight	Slight.
29C Portia	Slight	Slight	Severe: slope.	Slight	Slight.
30C Keeno	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: large stones, wetness.	Severe: small stones, large stones, droughty.
31C Waben	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
35D*: Hailey	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, droughty.
Nixa	Severe: small stones, percs slowly.	Severe: small stones, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: small stones.	Severe: small stones.
36D*: Nixa	Severe: small stones, percs slowly.	Severe: small stones, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: small stones.	Severe: small stones.
Clarksville	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
40D*: Noark	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
Clarksville	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
41E Noark	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
44G*:					
Hailey	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, droughty, slope.
Rock outcrop.					
Moko	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, depth to rock.
45F	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
Clarksville					
46G*:					
Clarksville	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Rock outcrop.					
Moko	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, depth to rock.
50C	Severe: small stones, percs slowly.	Severe: small stones, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: small stones.	Severe: small stones.
Nixa					
51B*:					
Tonti	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness, droughty.
Scholten	Severe: small stones, percs slowly.	Severe: small stones, percs slowly.	Severe: small stones, percs slowly.	Moderate: wetness.	Severe: small stones.
54	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.	Severe: wetness, flooding.
Dunning					
55*:					
Elk	Severe: flooding.	Slight	Moderate: flooding.	Severe: erodes easily.	Moderate: flooding.
Huntington	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
61B	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
Hoberg					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
76--- Racoon	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
81B--- Tonti	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness, droughty.
82B*: Rock outcrop.					
Lithic Udorthents.					
83F*: Moko---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, depth to rock.
Rock outcrop.					
83G*: Rock outcrop.					
Moko---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, depth to rock.
84D*: Bardley---	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
Moko---	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones, depth to rock.
Rock outcrop.					
85D*: Moko---	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: large stones, depth to rock.
Rock outcrop.					
Blueye---	Severe: percs slowly.	Severe: percs slowly.	Severe: small stones, percs slowly.	Slight---	Moderate: small stones, large stones, droughty.
85F*: Moko---	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, depth to rock.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
85F*:					
Blueye	Severe: percs slowly.	Severe: percs slowly.	Severe: small stones, percs slowly.	Slight	Moderate: small stones, large stones, droughty.
Rock outcrop.					
86D*:					
Mano	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, large stones.
Gatewood	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight	Moderate: large stones, droughty, slope.
86F*:					
Mano	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, large stones, slope.
Ocie	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
87F*:					
Moko	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, depth to rock.
Snead	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Rock outcrop.					
88D*:					
Blueye	Severe: percs slowly.	Severe: percs slowly.	Severe: small stones, percs slowly.	Slight	Moderate: small stones, large stones, droughty.
Moko	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, droughty.
89D*:					
Mano	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
Ocie	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
89F*:					
Mano	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Ocie	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
91B--- Viraton	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Moderate: wetness.
92A--- Secesh	Severe: flooding.	Slight---	Moderate: small stones.	Slight---	Moderate: large stones.
93B*:					
Waben	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
Cedargap	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones, flooding.	Severe: small stones.	Severe: small stones, flooding.
94B--- Hercules	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: droughty.
96*:					
Pits.					
Dumps.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
11B---- Pembroke	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
15C---- Scholten	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
16B---- Creldon	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
18B---- Captina	Good	Good	Good	Good	Good	Poor	Poor	Good	Poor	Poor.
19B---- Needleye	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
20B---- Branson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
21B---- Claiborne	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
22B---- Britwater	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
23B*:										
Lily----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ramsey----	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.
24A*:										
Parsons----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Barden----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Carytown----	Poor	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
26B2---- Yelton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
27E---- Beemont	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
28C---- Beemont	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
29C---- Portia	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30C---- Keeno	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
31C---- Waben	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Fair.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
35D*:										
Hailey	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Nixa	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
36D*:										
Nixa	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Clarksville	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
40D*:										
Noark	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Clarksville	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
41E---------- Noark	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
44G*:										
Hailey	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
Moko	Very poor.	Very poor.	Poor	---	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
45F---------- Clarksville	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
46G*:										
Clarksville	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
Moko	Very poor.	Very poor.	Poor	---	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
50C---------- Nixa	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
51B*:										
Tonti	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Very poor.
Scholten	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
54---------- Dunning	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
55*:										
Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
61B Hoberg	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
76 Racoon	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
81B Tonti	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
83F*:										
Moko	Very poor.	Poor	Poor	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
83G*:										
Rock outcrop.										
Moko	Very poor.	Very poor.	Poor	---	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
84D*:										
Bardley	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Moko	Very poor.	Poor	Poor	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
85D*:										
Moko	Very poor.	Poor	Poor	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
Blueye	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
85F*:										
Moko	Very poor.	Poor	Poor	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Blueye	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Rock outcrop.										

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
86D*:										
Mano	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Gatewood	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
86F*:										
Mano	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ocie	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
87F*:										
Moko	Very poor.	Poor	Poor	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Snead	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
88D*:										
Blueye	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Moko	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
89D*:										
Mano	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ocie	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
89F*:										
Mano	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ocie	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
91B Viraton	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
92A Secesh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
93B*:										
Waben	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Fair.
Cedargap	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
94B Hercules	Fair	Good	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
11B Pembroke	Moderate: too clayey.	Slight	Moderate: shrink-swell.	Slight	Severe: low strength.	Slight.
15C Scholten	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, slope, shrink-swell.	Moderate: wetness, shrink-swell, frost action.	Severe: small stones.
16B Creldon	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
18B Captina	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Slight.
19B Needleye	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness, droughty.
20B Branson	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
21B Claiborne	Slight	Slight	Slight	Slight	Moderate: low strength.	Slight.
22B Britwater	Moderate: too clayey.	Slight	Moderate: shrink-swell.	Slight	Moderate: low strength.	Moderate: small stones.
23B*:						
Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: depth to rock.
Ramsey	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
24A*:						
Parsons	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
Barden	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Carytown	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: excess sodium, wetness.
26B2 Yelton	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
27E Beemont	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: small stones, large stones.
28C Beemont	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
29C Portia	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Slight	Slight.
30C Keeno	Severe: wetness.	Moderate: wetness, large stones.	Severe: wetness.	Moderate: wetness, slope, large stones.	Moderate: wetness, frost action.	Severe: small stones, large stones, droughty.
31C Waben	Slight	Slight	Slight	Moderate: slope.	Slight	Severe: small stones.
35D*: Hailey	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.	Severe: small stones, droughty.
Nixa	Severe: wetness.	Moderate: wetness.	Severe: setness.	Moderate: slope, wetness.	Slight	Severe: small stones.
36D*: Nixa	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Slight	Severe: small stones.
Clarksville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.
40D*: Noark	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope.	Severe: small stones.
Clarksville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.
41E Noark	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope.	Severe: small stones.
44G*: Hailey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty, slope.
Rock outcrop.						

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
44G*:						
Moko	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.
45F---------- Clarksville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
46G*:						
Clarksville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.						
Moko	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.
50C---------- Nixa	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Slight---------	Severe: small stones.
51B*:						
Tonti	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Scholten	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, slope, shrink-swell.	Moderate: wetness, shrink-swell, frost action.	Severe: small stones.
54---------- Dunning	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
55*:						
Elk	Moderate: too clayey, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Huntington	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
61B---------- Hoberg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
76---------- Racoon	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
81B---------- Tonti	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
82B*: Rock outcrop.						
Lithic Udorthents.						
83F*: Moko----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.
Rock outcrop.						
83G*: Rock outcrop.						
Moko----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.
84D*: Bardley----------	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Severe: small stones.
Moko----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.
Rock outcrop.						
85D*: Moko----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.
Rock outcrop.						
Blueye----------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: small stones, large stones, droughty.
85F*: Moko----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
85F*:						
Blueye	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: small stones, large stones, droughty.
Rock outcrop.						
86D*:						
Mano	Moderate: too clayey, slope.	Moderate: slope.	Severe: shrink-swell.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones, large stones.
Gatewood	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: large stones, droughty, slope.
86F*:						
Mano	Severe: slope.	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
Ocie	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: small stones, slope.
87F*:						
Moko	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.
Snead	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Rock outcrop.						
88D*:						
Blueye	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: small stones, large stones, droughty.
Moko	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: large stones, droughty.
89D*:						
Mano	Moderate: too clayey, slope.	Moderate: slope.	Severe: shrink-swell.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
89D*:						
Ocie	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: small stones.
89F*:						
Mano	Severe: slope.	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Ocie	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: small stones, slope.
91B	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness.
Viraton						
92A	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: large stones.
Secesh						
93B*:						
Waben	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: small stones.
Cedargap	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones, flooding.
94B	Moderate: too clayey, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
Hercules						
96*:						
Pits.						
Dumps.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill	Application of poultry waste
11B Pembroke	Slight	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.	Slight.
15C Scholten	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: seepage.	Poor: too clayey, hard to pack, small stones.	Moderate: wetness, slope, large stones.
16B Creldon	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.	Moderate: wetness.
18B Captina	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, small stones.	Moderate: wetness.
19B Needleye	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, small stones, hard to pack.	Moderate: wetness.
20B Branson	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey.	Slight.
21B Claiborne	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Poor: small stones.	Slight.
22B Britwater	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack, small stones.	Slight.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill	Application of poultry waste
23B*:						
Lily	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.	Slight.
Ramsey	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.	Moderate: depth to rock.
24A*:						
Parsons	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.	Severe: wetness.
Barden	Severe: wetness, percs slowly.	Slight	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.	Moderate: wetness.
Carytown	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.	Severe: wetness, excess sodium.
26B2 Yelton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Poor: small stones.	Moderate: wetness.
27E Beemont	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.	Severe: slope, large stones.
28C Beemont	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.	Moderate: slope.
29C Portia	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, thin layer.	Moderate: slope.
30C Keeno	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, large stones.	Severe: seepage.	Poor: large stones.	Moderate: slope, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill	Application of poultry waste
31C Waben	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.	Moderate: slope.
35D*: Hailey	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: seepage.	Poor: seepage, small stones.	Severe: poor filter.
Nixa	Severe: percs slowly.	Severe: slope.	Moderate: large stones, too clayey.	Slight	Poor: small stones.	Moderate: slope, wetness, erodes easily.
36D*: Nixa	Severe: percs slowly.	Severe: slope.	Moderate: large stones, too clayey.	Slight	Poor: small stones.	Moderate: slope, wetness, erodes easily.
Clarksville	Moderate: slope.	Severe: seepage, slope.	Moderate: slope, too clayey.	Severe: seepage.	Poor: small stones.	Moderate: slope, erodes easily.
40D*: Noark	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, small stones.	Moderate: slope, erodes easily.
Clarksville	Moderate: slope.	Severe: seepage, slope.	Moderate: slope, too clayey.	Severe: seepage.	Poor: small stones.	Moderate: slope, erodes easily.
41E Noark	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, small stones.	Severe: slope, erodes easily.
44G*: Hailey	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, small stones, slope.	Severe: poor filter, slope, erodes easily.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill	Application of poultry waste
44G*:						
Rock outcrop.						
Moko	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, slope.	Severe: depth to rock, slope, erodes easily.
45F	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.	Severe: slope, erodes easily.
Clarksville						
46G*:						
Clarksville	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.	Severe: slope, erodes easily.
Rock outcrop.						
Moko	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, slope.	Severe: depth to rock, slope, erodes easily.
50C	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: large stones, too clayey.	Slight	Poor: small stones.	Moderate: wetness, slope.
Nixa						
51B*:						
Tonti	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack, small stones.	Moderate: wetness.
Scholten	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: seepage.	Poor: too clayey, hard to pack, small stones.	Moderate: wetness.
54	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.	Severe: ponding.
Dunning						

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill	Application of poultry waste
55*:						
Elk	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey, thin layer.	Moderate: flooding.
Huntington	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.	Severe: flooding.
61B						
Hoberg	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.	Moderate: wetness.
76						
Racoon	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.	Severe: wetness.
81B						
Tonti	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack, small stones.	Moderate: wetness.
82B*:						
Rock outcrop.						
Lithic Udorthents.						
83F*:						
Moko	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, slope.	Severe: slope, depth to rock, erodes easily.
Rock outcrop.						
83G*:						
Rock outcrop.						
Moko	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, slope.	Severe: depth to rock, slope, erodes easily.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill	Application of poultry waste
84D*:						
Bardley	Severe: thin layer, seepage.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage.	Moderate: seepage, slope.	Poor: area reclaim, too clayey, hard to pack.	Moderate: slope.
Moko	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock.	Moderate: depth to rock, slope, large stones.
Rock outcrop.						
85D*:						
Moko	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock.	Moderate: depth to rock, slope, large stones.
Rock outcrop.						
Blueye	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.	Moderate: slope.
85F*:						
Moko	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, slope.	Severe: slope, large stones, erodes easily.
Blueye	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.	Severe: slope, large stones, erodes easily.
Rock outcrop.						
86D*:						
Mano	Severe: percs slowly.	Severe: seepage, slope, large stones.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.	Severe: large stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill	Application of poultry waste
86D*:						
Gatewood	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.	Severe: large stones.
86F*:						
Mano	Severe: percs slowly, slope.	Severe: seepage, slope, large stones.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.	Severe: slope, large stones, erodes easily.
Ocie	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, small stones.	Moderate: wetness.
87F*:						
Moko	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, slope.	Severe: slope, erodes easily.
Snead	Severe: thin layer, seepage.	Severe: seepage, slope, wetness.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: area reclaim, too clayey, hard to pack.	Moderate: wetness.
Rock outcrop.						
88D*:						
Blueye	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.	Moderate: slope.
Moko	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock.	Moderate: slope, depth to rock.
89D*:						
Mano	Severe: percs slowly.	Severe: seepage, slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.	Moderate: wetness, slope, erodes easily.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill	Application of poultry waste
89D*:						
Ocie	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.	Moderate: slope, erodes easily.
89F*:						
Mano	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.	Severe: slope, erodes easily.
Ocie	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.	Severe: slope, erodes easily.
91B Viraton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, small stones.	Moderate: wetness.
92A Secesh	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.	Slight.
93B*:						
Waben	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.	Moderate: erodes easily.
Cedargap	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: small stones.	Severe: flooding.
94B Hercules	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, small stones.	Moderate: flooding erodes easily.
96*:						
Pits.						
Dumps.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11B Pembroke	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
15C Scholten	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
16B Creldon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
18B Captina	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
19B Needleye	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
20B Branson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
21B Claiborne	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
22B Britwater	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
23B*: Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Ramsey	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
24A*: Parsons	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Barden	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Carytown	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
26B2 Yelton	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
27E---------- Beemont	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
28C---------- Beemont	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
29C---------- Portia	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
30C---------- Keeno	Fair: thin layer, large stones, wetness.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
31C---------- Waben	Good----------	Improbable: small stones.	Probable----------	Poor: small stones, area reclaim.
35D*:				
Hailey----------	Fair: large stones.	Improbable: small stones.	Probable----------	Poor: small stones, area reclaim.
Nixa----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
36D*:				
Nixa----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Clarksville----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
40D*:				
Noark----------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
Clarksville----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
41E---------- Noark	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
44G*:				
Hailey----------	Poor: slope.	Improbable: small stones.	Probable----------	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
44G*:				
Rock outcrop.				
Moko	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
45F	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Clarksville				
46G*:				
Clarksville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
Moko	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
50C	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Nixa				
51B*:				
Tonti	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Scholten	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
54	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Dunning				
55*:				
Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Huntington	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
61B	Fair: wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Hoberg				
76	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Racoon				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
81B Tonti	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
82B*: Rock outcrop.				
Lithic Udorthents.				
83F*: Moko	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
Rock outcrop.				
83G*: Rock outcrop.				
Moko	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
84D*: Bardley	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Moko	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones.
Rock outcrop.				
85D*: Moko	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones.
Rock outcrop.				
Blueye	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
85F*: Moko	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
Blueye	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
86D*:				
Mano	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Gatewood	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
86F*:				
Mano	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ocie	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
87F*:				
Moko	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
Snead	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, large stones.
Rock outcrop.				
88D*:				
Blueye	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Moko	Poor: depth to rock, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones.
89D*:				
Mano	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Ocie	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
89F*:				
Mano	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
89F*:				
Ocie	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
91B	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
92A	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
93B*:				
Waben	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
Cedargap	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
94B	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
96*:				
Pits.				
Dumps.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
11B---------- Pembroke	Moderate: seepage.	Moderate: hard to pack.	Deep to water	Favorable------	Favorable------	Favorable.
15C---------- Scholten	Severe: seepage.	Severe: seepage.	Percs slowly, large stones, slope.	Slope, wetness, droughty.	Large stones, wetness.	Large stones, droughty.
16B---------- Creldon	Moderate: seepage.	Moderate: thin layer, hard to pack, wetness.	Percs slowly---	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, rooting depth.
18B---------- Captina	Moderate: seepage.	Moderate: piping, wetness.	Percs slowly---	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, rooting depth.
19B---------- Needleye	Moderate: seepage.	Severe: hard to pack.	Percs slowly---	Wetness, droughty, percs slowly.	Erodes easily, wetness, rooting depth.	Erodes easily, droughty, rooting depth.
20B---------- Branson	Moderate: seepage.	Slight---------	Deep to water	Favorable------	Erodes easily	Erodes easily.
21B---------- Claiborne	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
22B---------- Britwater	Moderate: seepage, slope.	Moderate: piping, hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
23B*:						
Lily----------	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing, depth to rock.	Depth to rock, soil blowing.	Depth to rock.
Ramsey----------	Severe: depth to rock.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Depth to rock	Droughty, depth to rock.
24A*:						
Parsons----------	Slight---------	Severe: wetness.	Percs slowly---	Percs slowly---	Wetness, percs slowly.	Wetness, percs slowly.
Barden----------	Slight---------	Moderate: wetness.	Percs slowly---	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
Carytown---------	Slight---------	Severe: hard to pack, wetness, excess sodium.	Percs slowly, excess sodium.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
26B2---------- Yelton	Moderate: slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, droughty.	Erodes easily, wetness.	Erodes easily, droughty.
27E---------- Beemont	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, percs slowly.	Slope, droughty, percs slowly.
28C---------- Beemont	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Percs slowly---	Percs slowly.
29C---------- Portia	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, soil blowing.	Soil blowing---	Favorable.
30C---------- Keeno	Severe: seepage.	Severe: large stones.	Percs slowly, large stones, slope.	Slope, large stones, wetness.	Large stones, wetness.	Large stones, droughty.
31C---------- Waben	Severe: seepage.	Severe: thin layer.	Deep to water	Droughty, slope.	Favorable------	Droughty.
35D*:						
Hailey----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
Nixa----------	Moderate: seepage, slope.	Moderate: large stones.	Deep to water	Slope, droughty, percs slowly.	Large stones, rooting depth.	Large stones, droughty.
36D*:						
Nixa----------	Moderate: seepage, slope.	Moderate: large stones.	Deep to water	Slope, droughty, percs slowly.	Large stones, rooting depth.	Large stones, droughty.
Clarksville------	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
40D*:						
Noark----------	Moderate: seepage, slope.	Slight---------	Deep to water	Droughty, slope.	Slope----------	Slope, droughty.
Clarksville------	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
41E---------- Noark	Moderate: seepage, slope.	Slight---------	Deep to water	Droughty, slope.	Slope----------	Slope, droughty.
44G*:						
Hailey----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
44G*:						
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
45F--- Clarksville	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
46G*:						
Clarksville	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop.						
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
50C--- Nixa	Moderate: seepage, slope.	Moderate: large stones.	Deep to water	Slope, droughty, percs slowly.	Large stones, rooting depth.	Large stones, droughty.
51B*:						
Tonti	Moderate: seepage, slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, wetness, droughty.	Large stones, erodes easily.	Large stones, erodes easily.
Scholten	Severe: seepage.	Severe: seepage.	Percs slowly, large stones, slope.	Slope, wetness, droughty.	Large stones, wetness.	Large stones, droughty.
54--- Dunning	Slight	Severe: wetness.	Percs slowly, flooding.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
55*:						
Elk	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Huntington	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
61B--- Hoberg	Moderate: seepage, slope.	Moderate: large stones, wetness.	Percs slowly, large stones, slope.	Slope, wetness, droughty.	Large stones, erodes easily, wetness.	Large stones, erodes easily, wetness.
76--- Racoon	Slight	Severe: thin layer, ponding.	Ponding, percs slowly, flooding.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
81B--- Tonti	Moderate: seepage.	Severe: hard to pack.	Percs slowly---	Wetness, droughty.	Large stones, erodes easily.	Large stones, erodes easily.
82B*:						
Rock outcrop.						
Lithic Udorthents.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
83F*:						
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
83G*:						
Rock outcrop.						
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
84D*:						
Bardley	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope, droughty, thin layer.	Slope, depth to rock, area reclaim.	Slope, droughty, depth to rock.
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
85D*:						
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
Blueye	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Droughty, percs slowly, depth to rock.	Depth to rock, erodes easily, percs slowly.	Erodes easily, droughty, depth to rock.
85F*:						
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Blueye	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Droughty, percs slowly, depth to rock.	Depth to rock, erodes easily, percs slowly.	Erodes easily, droughty, depth to rock.
Rock outcrop.						
86D*:						
Mano	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, large stones, percs slowly.	Large stones, slope, droughty.
Gatewood	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
86F*:						
Mano	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, large stones, percs slowly.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
86F*:						
Ocie	Severe: slope.	Severe: thin layer.	Deep to water	Slope, droughty, percs slowly.	Slope, percs slowly.	Slope, droughty, percs slowly.
87F*:						
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Snead	Severe: slope.	Severe: thin layer.	Percs slowly, thin layer, slope.	Wetness, percs slowly.	Slope, area reclaim, erodes easily.	Slope, erodes easily, area reclaim.
Rock outcrop.						
88D*:						
Blueye	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Droughty, percs slowly, depth to rock.	Depth to rock, erodes easily, percs slowly.	Erodes easily, droughty, depth to rock.
Moko	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
89D*, 89F*:						
Mano	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, droughty, percs slowly.	Slope, percs slowly.	Slope, droughty, percs slowly.
Ocie	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water	Slope, droughty, percs slowly.	Slope, large stones.	Large stones, slope.
91B---------- Viraton	Moderate: seepage, slope.	Moderate: piping, wetness.	Percs slowly, slope.	Slope, wetness, droughty.	Erodes easily, wetness.	Erodes easily, droughty.
92A---------- Secesh	Severe: seepage.	Slight---------	Deep to water	Favorable------	Favorable------	Favorable.
93B*:						
Waben	Severe: seepage.	Severe: thin layer.	Deep to water	Droughty, slope.	Favorable------	Droughty.
Cedargap	Moderate: seepage.	Severe: piping.	Deep to water	Droughty, flooding.	Large stones---	Large stones.
94B---------- Hercules	Moderate: seepage, slope.	Slight---------	Deep to water	Slope, droughty, flooding.	Favorable------	Droughty.
96*:						
Pits.						
Dumps.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
11B	0-18	Silt loam	ML, CL	A-4, A-6	0	95-100	90-100	80-100	70-100	25-40	3-16
Pembroke	18-38	Silty clay loam	CL	A-6, A-7	0	95-100	90-100	85-100	75-100	30-45	11-25
	38-60	Silty clay loam, silty clay.	CH, CL	A-7, A-6	0	90-100	75-100	75-100	65-100	35-65	20-45
15C	0-9	Gravelly silt loam.	GM-GC, GC, CL-ML, CL	A-4, A-2, A-6	0-10	45-80	40-75	40-75	30-70	18-30	4-16
Scholten	9-24	Very gravelly silty clay loam, extremely gravelly silty clay loam.	GC, CL, SC	A-2, A-6	0-15	30-75	25-65	25-65	25-65	30-40	11-20
	24-33	Very gravelly silty clay loam, very gravelly silt loam.	GC, CL	A-2, A-6, A-4	10-40	20-65	20-60	20-60	20-55	25-40	8-15
	33-60	Gravelly clay, very gravelly clay, gravelly silty clay.	GC, CL, CH, GM	A-2, A-7	10-40	20-65	20-60	20-60	15-55	45-80	20-40
16B	0-10	Silt loam	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	80-95	20-40	2-15
Creldon	10-27	Silty clay loam, silty clay.	CH	A-7	0	90-100	90-100	85-95	80-95	50-60	25-35
	27-50	Very gravelly silty clay loam, extremely gravelly silty clay loam.	GC	A-2, A-6, A-7	0-25	30-65	30-60	25-55	20-50	35-45	15-25
	50-60	Very gravelly clay, extremely gravelly clay, gravelly clay.	GC, CH, SC	A-2, A-7	5-35	45-75	40-75	35-70	30-65	55-80	35-60
18B	0-9	Silt loam	CL-ML, CL	A-4	0	95-100	90-100	85-100	75-90	<30	4-10
Captina	9-24	Silt loam, silty clay loam.	CL	A-6, A-4, A-7	0	95-100	90-100	85-100	80-95	20-45	8-25
	24-60	Silt loam, silty clay loam, gravelly silty clay loam.	CL, SC	A-6, A-4, A-7	0-5	75-100	50-100	45-95	35-95	20-45	8-25
19B	0-5	Silt loam	CL-ML, CL	A-4, A-6	0-5	95-100	90-100	85-100	80-90	25-35	4-12
Needleye	5-23	Silt loam, silty clay loam.	CL	A-6, A-7	0-5	95-100	90-100	90-100	80-95	35-45	11-20
	23-44	Very gravelly silty clay loam, extremely gravelly silt loam.	GC, SC, CL	A-2, A-4, A-6	5-25	30-75	25-65	20-65	20-60	25-35	8-15
	44-60	Gravelly clay, gravelly silty clay, very gravelly clay.	GC, CH, MH, GM	A-2, A-7	5-25	45-65	40-65	35-65	30-60	50-80	20-50

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
20B---------- Branson	0-4	Silt loam--------	CL-ML, CL	A-4	0	90-100	85-100	75-100	60-90	20-30	4-10
	4-12	Silt loam--------	CL-ML, CL	A-4	0	90-100	85-100	75-100	60-90	20-30	4-10
	12-24	Silty clay loam, silt loam.	CL	A-6	0	90-100	85-100	75-100	60-95	30-40	11-20
	24-58	Silty clay loam, silty clay, gravelly silty clay loam.	CL, GC, SC	A-6, A-7	0	55-100	50-100	50-100	40-95	35-50	15-25
	58-60	Clay, gravelly clay.	CL, CH, SC, GC	A-7	0	55-100	50-100	45-100	40-95	45-70	20-35
21B---------- Claiborne	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0-5	80-100	75-95	70-90	60-85	24-35	4-10
	8-30	Silt loam, silty clay loam, gravelly silty clay loam.	CL	A-4, A-6	0-5	75-95	70-90	65-85	55-80	25-38	7-15
	30-60	Gravelly silty clay loam, very gravelly silty clay loam.	GC	A-4, A-6, A-2	0-5	40-60	30-55	25-50	25-45	28-40	8-20
22B---------- Britwater	0-6	Gravelly silt loam.	CL-ML, SC, SC-SM, CL	A-4	0	60-75	60-75	55-75	40-60	<30	6-10
	6-21	Gravelly silty clay loam, gravelly clay loam, silty clay loam.	CL, GC, SC	A-6, A-4	0	50-95	50-95	50-90	40-80	23-38	8-15
	21-60	Very gravelly silty clay loam, gravelly silty clay loam, gravelly clay loam.	GC, SC, CL	A-2, A-6, A-7	0-5	40-80	40-75	40-75	30-70	30-50	11-23
23B*:											
Lily----------	0-9	Loam----------	SM, SC-SM	A-4, A-2	0-5	90-100	75-100	60-85	30-55	15-25	NP-5
	9-24	Loam, clay loam	SC, CL, SC-SM	A-4, A-6	0-5	90-100	75-100	75-95	40-75	20-35	5-15
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ramsey----------	0-4	Fine sandy loam	SM, CL-ML, ML, SC-SM	A-4, A-2	0-10	85-100	75-95	60-75	30-70	<25	NP-7
	4-11	Loam, sandy loam, fine sandy loam.	SM, CL-ML, ML, SC-SM	A-4, A-2	0-10	85-100	75-95	60-77	30-70	<25	NP-7
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
24A*:											
Parsons---------	0-11	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	96-100	96-100	80-97	20-37	1-12
	11-60	Clay loam, silty clay loam, silty clay.	CL, CH	A-6, A-7	0	100	96-100	96-100	80-99	37-70	15-40

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
24A*:											
Barden	0-12	Silt loam	CL	A-4, A-6	0	100	100	90-100	75-85	25-35	8-15
	12-27	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	80-90	30-45	15-25
	27-40	Silty clay, silty clay loam, clay loam.	CL, CH	A-7	0	100	100	90-100	80-95	40-60	25-40
	40-60	Silty clay loam, clay loam, sandy clay loam.	CL	A-6, A-7	0	100	90-100	90-100	50-90	30-45	15-25
Carytown	0-10	Silt loam	CL-ML, CL	A-4, A-6	0	100	95-100	95-100	80-95	20-30	5-15
	10-16	Silt loam	CL-ML, CL	A-4, A-6	0	100	95-100	95-100	80-95	20-30	5-15
	16-60	Clay, silty clay	CH	A-7	0	100	95-100	90-100	90-100	51-70	30-45
26B2 Yelton	0-8	Loam	ML, CL-ML, SM, SC-SM	A-4	0	95-100	85-100	45-75	45-70	<20	NP-5
	8-20	Silty clay loam, clay loam, sandy clay loam.	SC-SM, SC, CL-ML, CL	A-2, A-4	0	95-100	85-100	40-90	30-85	20-30	5-10
	20-56	Loam, clay loam, extremely gravelly sandy clay loam.	SC-SM, GM-GC, CL-ML, SC	A-1, A-2, A-4	0-10	20-100	10-100	10-90	10-80	20-30	5-10
	56-60	Very channery clay loam, gravelly sandy clay loam, very gravelly clay.	SC-SM, SC, GM-GC, GC	A-2, A-4, A-6, A-7	0-10	35-75	25-75	10-50	10-40	20-50	5-25
27E Beemont	0-4	Cobbly very fine sandy loam.	SC-SM, SC, GM-GC, GC	A-4, A-2-4, A-1-b	0-40	50-90	25-65	20-60	15-40	20-30	NP-10
	4-10	Cobbly very fine sandy loam.	SC-SM, SC, GM, GC	A-4, A-2-4	0-10	65-90	50-85	40-80	25-50	20-30	NP-10
	10-44	Clay	CH	A-7	0	95-100	75-100	70-100	55-95	75-100	50-70
	44-49	Cobbly sandy clay loam, channery sandy clay loam.	SC, GC	A-6, A-2-6, A-2-7, A-7	0	60-90	50-75	40-70	20-40	35-50	15-30
	49	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
28C Beemont	0-8	Loam	CL, ML, CL-ML	A-6, A-4	0-5	80-100	75-100	70-95	60-90	15-35	NP-15
	8-45	Clay	CH	A-7	0-5	80-100	75-100	70-100	65-95	65-90	45-70
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
29C Portia	0-7	Fine sandy loam	SM, SC-SM	A-4, A-2	0	90-100	85-100	50-85	25-50	<25	NP-7
	7-16	Loam, sandy clay loam.	CL, CL-ML, SC, SC-SM	A-4, A-6, A-2	0	90-100	85-100	65-95	30-75	23-38	7-15
	16-60	Clay loam, loam, sandy clay loam.	CL, SC	A-4, A-6, A-2, A-7	0	100	85-100	65-100	30-80	25-43	8-18

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
30C---------- Keeno	0-10	Very gravelly silt loam.	CL-ML, CL, GC, SC	A-2-4, A-4	0-35	45-90	30-50	30-70	30-65	15-25	2-10
	10-23	Extremely gravelly silty clay loam, very gravelly silty clay loam.	GC	A-6, A-2-6	0-35	25-55	20-50	15-45	15-45	30-40	10-20
	23-31	Extremely gravelly silty clay loam, extremely gravelly silt loam.	CL, GC, SC	A-6, A-2-6	20-60	45-75	30-70	25-65	20-65	30-40	10-20
	31-60	Extremely gravelly silty clay, very gravelly silty clay, very gravelly clay.	CH, CL, SC, GC	A-7, A-2-7	40-75	65-90	30-90	25-85	20-85	40-65	20-45
31C---------- Waben	0-5	Very gravelly silt loam.	GM, GM-GC	A-1, A-2, A-4	0-10	30-55	25-50	25-50	15-45	10-25	NP-7
	5-60	Very gravelly silt loam, extremely gravelly silty clay loam.	GC, GM-GC, GP-GC	A-6, A-1, A-2, A-4	0-10	20-55	15-50	10-50	5-45	20-40	5-15
35D*:											
Hailey----------	0-6	Very gravelly silt loam.	GM, GM-GC, GP-GM	A-1, A-2-4, A-4	0-20	15-5-	20-50	20-50	15-50	<20	3-5
	6-60	Extremely gravelly silt loam, very gravelly silt loam.	GM, GC, GP-GM, GP-GC	A-1, A-2-4, A-4	0-40	15-50	10-50	10-50	5-45	<25	3-8
Nixa----------	0-3	Very gravelly silt loam.	GC, GM-GC	A-2, A-4, A-6	0-10	30-55	25-50	25-50	15-45	25-35	6-15
	3-12	Very gravelly silt loam, very gravelly loam, gravelly silt loam.	CL, SC, SC-SM, GM-GC	A-2, A-4, A-6	0-10	30-75	25-75	25-75	15-70	25-35	6-15
	12-24	Extremely gravelly silt loam, very gravelly silty clay loam.	GC, SC, GP-GC, SP-SC	A-2	0-10	25-60	15-50	15-50	12-15	30-40	11-20
	24-37	Very cobbly silt loam, extremely gravelly silt loam.	SC, GC	A-2	0-40	25-60	15-45	15-45	13-15	30-40	11-20
	37-60	Very cobbly silty clay, extremely gravelly silt loam.	GC, GP-GC, GW-GC	A-2	0-40	15-45	10-35	10-35	5-30	40-55	20-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
36D*:											
Nixa	0-3	Very gravelly silt loam.	GC, GM-GC	A-2, A-4, A-6	0-10	30-55	25-50	25-50	15-45	25-35	6-15
	3-9	Very gravelly silt loam, very gravelly loam, gravelly silt loam.	CL, SC, SC-SM, GM-GC	A-2, A-4, A-6	0-10	30-75	25-75	25-75	15-70	25-35	6-15
	9-20	Very gravelly silt loam, very gravelly silty clay loam.	GC, SC, GP-GC, SP-SC	A-2	0-10	25-60	15-50	15-50	12-15	30-40	11-20
	20-36	Very cobbly silt loam, extremely gravelly silty clay loam.	SC, GC	A-2	0-40	25-60	15-45	15-45	13-15	30-40	11-20
	36-60	Very gravelly silty clay, extremely gravelly clay.	GC, GP-GC, GW-GC	A-2	0-40	15-45	10-35	10-35	5-30	40-55	20-30
Clarksville	0-10	Very gravelly silt loam.	GC, SC, SC-SM, GP-GC	A-2-4, A-2-6, A-1-a	0-30	30-70	10-60	5-50	5-35	20-40	5-15
	10-29	Very gravelly silty clay loam, extremely gravelly silty clay loam.	GC, SC, SP-SC, GP-GC	A-2-6, A-6	0-20	30-70	10-60	10-50	5-45	30-40	15-25
	29-60	Very gravelly silty clay, gravelly clay, extremely gravelly silty clay.	GC, SC, GP-GC, SP-SC	A-7, A-2-7	0-20	30-70	20-60	10-50	10-45	55-75	35-55
40D*:											
Noark	0-3	Very gravelly silt loam.	GM, GM-GC, GC	A-2, A-1, A-4, A-6	0-10	30-50	25-50	25-50	20-45	<30	3-11
	3-9	Gravelly silt loam, very gravelly silt loam.	ML, GM, GM-GC, CL	A-2, A-1, A-4, A-6	0-10	30-75	25-75	25-70	20-60	<30	3-11
	9-13	Very gravelly silt loam, very gravelly silty clay loam.	GC	A-2, A-4, A-6	0-10	30-50	25-50	25-50	20-45	25-40	8-18
	13-22	Very gravelly clay, very gravelly silty clay.	GC, GM	A-2, A-7	0-10	30-50	25-50	25-50	25-45	41-70	18-33
	22-60	Very gravelly clay, extremely gravelly clay, very gravelly silty clay.	GC, GP-GC	A-2, A-7	0-15	10-50	10-50	10-50	10-45	45-70	20-38

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
40D*:											
Clarksville-----	0-11	Very gravelly silt loam.	GC, SC, SC-SM, GP-GC	A-2-4, A-2-6, A-1-a	0-30	30-70	10-60	5-50	5-35	20-40	5-15
	11-36	Gravelly silty clay loam, extremely gravelly silt loam.	GC, SC, SP-SC, GP-GC	A-2-6, A-6	0-20	30-70	10-60	10-50	5-45	30-40	15-25
	36-60	Very gravelly silty clay, very gravelly clay, extremely gravelly clay.	GC, SC, GP-GC, SP-SC	A-7, A-2-7	0-20	30-70	20-60	10-50	10-45	55-75	35-55
41E---------- Noark	0-4	Very gravelly silt loam.	GM, GM-GC, GC	A-2, A-1, A-4, A-6	0-10	30-50	25-50	25-50	20-45	<30	3-11
	4-10	Gravelly silt loam, very gravelly silt loam.	ML, GM, GM-GC, CL	A-2, A-1, A-4, A-6	0-10	30-75	25-75	25-70	20-60	<30	3-11
	10-25	Very gravelly silt loam, very gravelly silty clay loam.	GC	A-2, A-4, A-6	0-10	30-50	25-50	25-50	20-45	25-40	8-18
	25-40	Very gravelly clay, very gravelly silty clay.	GC, GM	A-2, A-7	0-10	30-50	25-50	25-50	25-45	41-70	18-33
	40-60	Very gravelly clay, extremely gravelly clay, very gravelly silty clay.	GC, GP-GC	A-2, A-7	0-15	10-50	10-50	10-50	10-45	45-70	20-38
44G*:											
Hailey----------	0-11	Extremely gravelly silt loam.	GM, GM-GC, GP-GM	A-1, A-2-4, A-4	0-20	15-5-	20-50	20-50	15-50	<20	3-5
	11-60	Extremely gravelly silt loam, very gravelly silt loam.	GM, GC, GP-GM, GP-GC	A-1, A-2-4, A-4	0-40	15-50	10-50	10-50	5-45	<25	3-8
Rock outcrop.											
Moko----------	0-3	Very flaggy silt loam.	CL, GC, SC	A-6	5-40	65-90	60-85	55-80	40-75	25-35	10-15
	3-10	Very flaggy silty clay loam, very stony loam, very stony silt loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-80	40-80	25-45	10-20
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
45F---------- Clarksville	0-16	Very gravelly silt loam.	GC, SC, SC-SM, GP-GC	A-2-4, A-2-6, A-1-a	0-30	30-70	10-60	5-50	5-35	20-40	5-15
	16-48	Very gravelly silt loam, extremely gravelly silty clay loam.	GC, SC, SP-SC, GP-GC	A-2-6, A-6	0-20	30-70	10-60	10-50	5-45	30-40	15-25
	48-60	Very gravelly silty clay, very gravelly clay, extremely gravelly clay.	GC, SC, GP-GC, SP-SC	A-7, A-2-7	0-20	30-70	20-60	10-50	10-45	55-75	35-55
46G*:											
Clarksville-----	0-10	Very gravelly silt loam.	GC, SC, SC-SM, GP-GC	A-2-4, A-2-6, A-1-a	0-30	30-70	10-60	5-50	5-35	20-40	5-15
	10-41	Very gravelly silty clay loam, very gravelly silt loam.	GC, SC, SP-SC, GP-GC	A-2-6, A-6	0-20	30-70	10-60	10-50	5-45	30-40	15-25
	41-60	Very gravelly silty clay, very gravelly clay, extremely gravelly clay.	GC, SC, GP-GC, SP-SC	A-7, A-2-7	0-20	30-70	20-60	10-50	10-45	55-75	35-55
Rock outcrop.											
Moko----------	0-3	Very stony silt loam.	CL, GC, SC	A-6	5-40	65-90	60-85	55-80	40-75	25-35	10-15
	3-10	Extremely stony silt loam, very stony loam, very stony silt loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-80	40-80	25-45	10-20
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
50C---------- Nixa	0-3	Very gravelly silt loam.	GC, GM-GC	A-2, A-4, A-6	0-10	30-55	25-50	25-50	15-45	25-35	6-15
	3-10	Very gravelly silt loam, very gravelly loam, gravelly silt loam.	CL, SC, SC-SM, GM-GC	A-2, A-4, A-6	0-10	30-75	25-75	25-75	15-70	25-35	6-15
	10-24	Very gravelly silt loam, extremely gravelly silt loam.	GC, SC, GP-GC, SP-SC	A-2	0-10	25-60	15-50	15-50	12-15	30-40	11-20
	24-39	Extremely gravelly silt loam, very gravelly silty clay loam.	SC, GC	A-2	0-40	25-60	15-45	15-45	13-15	30-40	11-20
	39-60	Very cobbly silty clay, very gravelly clay.	GC, GP-GC, GW-GC	A-2	0-40	15-45	10-35	10-35	5-30	40-55	20-30

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
51B*:											
Tonti	0-11	Silt loam	CL-ML, CL	A-4, A-6	0-5	90-100	75-100	70-100	60-90	20-35	4-14
	11-25	Gravelly silty clay loam, gravelly silt loam, silty clay loam.	CL, SC, GC	A-4, A-6	0-5	65-100	60-100	55-100	45-95	25-40	8-20
	25-42	Gravelly sandy loam, very gravelly silty clay loam.	GC, CL, SC	A-2, A-4, A-6	0-35	35-75	30-70	25-70	20-65	25-40	7-20
	42-60	Extremely gravelly silty clay, very gravelly clay, very gravelly silty clay.	GC, CL, CH, SC	A-2, A-7	0-15	20-70	5-70	5-70	5-65	45-80	25-50
Scholten	0-12	Gravelly silt loam.	GM-GC, GC, CL-ML, CL	A-4, A-2, A-6	0-10	45-80	40-75	40-75	30-70	18-30	4-16
	12-20	Very gravelly silty clay loam, extremely gravelly silty clay loam.	GC, CL, SC	A-2, A-6	0-15	30-75	25-65	25-65	25-65	30-40	11-20
	20-35	Extremely gravelly silty clay loam, very gravelly silt loam.	GC, CL	A-2, A-6, A-4	10-40	20-65	20-60	20-60	20-55	25-40	8-15
	35-60	Gravelly clay, extremely gravelly clay, gravelly silty clay.	GC, CL, CH, GM	A-2, A-7	10-40	20-65	20-60	20-60	15-55	45-80	20-40
54	0-13	Silt loam	ML, CL, CL-ML	A-6, A-4	0	100	95-100	90-100	85-100	25-35	4-11
Dunning	13-60	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-5	90-100	70-100	60-100	60-100	45-70	20-40
55*:											
Elk	0-19	Silt loam	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	19-41	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
	41-60	Silty clay loam, silt loam, silty clay.	ML, CL, CL-ML, SC-SM	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
Huntington	0-10	Silt loam	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	10-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
61B---------- Hoberg	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	80-100	75-100	70-95	65-90	25-35	7-15
	8-18	Silt loam, silty clay loam, clay loam.	CL	A-6	0	80-100	75-100	70-95	60-95	30-40	11-20
	18-24	Gravelly silty clay loam, gravelly clay loam.	GC, CL, SC	A-6	0-10	55-80	50-75	45-70	40-65	30-40	11-20
	24-48	Extremely gravelly silty clay loam, very gravelly silt loam.	GC, GP-GC	A-2, A-6	5-40	20-50	15-45	15-45	12-40	30-40	11-20
	48-60	Very gravelly clay, very gravelly silty clay, extremely gravelly silty clay.	GC, GP-GC	A-2, A-7	5-40	20-50	15-45	15-45	12-40	50-75	35-55
76---------- Racoon	0-9	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	20-40	8-20
	9-30	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-40	5-20
	30-60	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	15-30
81B---------- Tonti	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0-5	90-100	75-100	70-100	60-90	20-35	4-14
	8-26	Gravelly silty clay loam, gravelly silt loam, silty clay loam.	CL, SC, GC	A-4, A-6	0-5	65-100	60-100	55-100	45-95	25-40	8-20
	26-60	Gravelly sandy loam, very gravelly silty clay loam.	GC, CL, SC	A-2, A-4, A-6	0-35	35-75	30-70	25-70	20-65	25-40	7-20
82B*: Rock outcrop.											
Lithic Udorthents.											
83F*: Moko----------	0-3	Very flaggy silty clay loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-85	45-80	35-45	15-20
	3-10	Extremely flaggy silt loam, very flaggy silty clay loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-80	40-80	25-45	10-20
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
83G*: Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
83G*:											
Moko	0-4	Very stony silt loam.	CL, GC, SC	A-6	5-40	65-90	60-85	55-80	40-75	25-35	10-15
	4-9	Very stony silty clay loam, very stony silt loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-80	40-80	25-45	10-20
	9	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
84D*:											
Bardley	0-2	Very gravelly silt loam.	GC, CL, SC	A-6, A-2	0-15	40-90	30-75	30-70	25-65	30-40	10-20
	2-8	Very gravelly silt loam, extremely gravelly silty clay loam.	GC, GP-GC	A-2	0-15	15-30	10-25	5-25	5-25	35-45	15-20
	8-38	Silty clay, clay, gravelly clay.	GM, SM, MH	A-7	0-10	70-95	50-95	50-90	40-85	50-70	20-35
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Moko	0-3	Very flaggy silty clay loam.	CL, GC, SC	A-6	5-40	65-90	60-85	55-80	40-75	25-35	10-15
	3-10	Very flaggy silty clay loam, very stony silt loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-80	40-80	25-45	10-20
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
85D*:											
Moko	0-3	Very flaggy silty clay loam.	CL, GC, SC	A-6	5-40	65-90	60-85	55-80	40-75	25-35	10-15
	3-10	Extremely stony silt loam, very flaggy silty clay loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-80	40-80	25-45	10-20
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Blueye	0-12	Gravelly silt loam.	CL-ML, CL, GC, SC	A-4, A-6	0-10	50-75	50-75	45-75	35-65	25-35	5-15
	12-18	Gravelly silty clay loam, very gravelly silt loam.	CL-ML, CL, GC, SC	A-4, A-6, A-2-4	0-10	40-75	35-75	30-75	25-70	25-35	5-15
	18-39	Clay, gravelly clay.	CH, GC, SC	A-7	0-5	55-90	50-90	50-90	40-85	65-85	45-60
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
85F*:											
Moko	0-8	Very flaggy silty clay loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-85	45-80	35-45	15-20
	8-16	Extremely stony silt loam, very flaggy silty clay loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-80	40-80	25-45	10-20
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Blueye	0-11	Gravelly silt loam.	CL-ML, CL, GC, SC	A-4, A-6	0-10	50-75	50-75	45-75	35-65	25-35	5-15
	11-23	Gravelly silt loam, very gravelly silt loam.	CL-ML, CL, GC, SC	A-4, A-6, A-2-4	0-10	40-75	35-75	30-75	25-70	25-35	5-15
	23-30	Silty clay, gravelly silty clay, gravelly clay.	CH, GC, SC	A-7	0-5	55-90	50-90	50-90	40-85	60-85	35-60
	30-37	Clay, gravelly clay.	CH, GC, SC	A-7	0-5	55-90	50-90	50-90	40-85	65-85	45-60
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
86D*:											
Mano	0-13	Very gravelly silt loam.	GM, GC, GM-GC	A-2, A-4, A-1-b	0-40	30-60	30-60	25-55	20-50	16-25	3-8
	13-33	Very gravelly silt loam, very gravelly silty clay loam.	GC	A-2, A-6	0-15	25-55	25-50	25-50	25-45	30-40	10-15
	33-68	Clay, silty clay, gravelly clay.	CH	A-7	0-5	70-95	70-95	65-90	55-85	50-75	30-45
Gatewood	0-9	Very gravelly silt loam.	CL, CL-ML	A-4, A-6	0-20	90-100	85-100	75-100	60-95	20-35	5-15
	9-39	Gravelly silty clay, gravelly clay, clay.	CH, SC	A-7	0-25	80-95	50-90	40-85	40-85	55-75	30-45
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
86F*:											
Mano	0-13	Extremely gravelly silt loam.	GM, GC, GM-GC	A-2, A-4, A-1-b	0-40	30-60	30-60	25-55	20-50	16-25	3-8
	13-22	Extremely gravelly silt loam, extremely gravelly silty clay loam.	GC, GP-GC	A-2	0-15	10-30	10-25	10-25	10-25	25-40	8-15
	22-33	Very gravelly silt loam, very gravelly silty clay loam.	GC	A-2, A-6	0-15	25-55	25-50	25-50	25-45	30-40	10-15
	33-60	Clay, silty clay, gravelly clay.	CH	A-7	0-5	70-95	70-95	65-90	55-85	50-75	30-45

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
86F*:											
Ocie	0-9	Extremely gravelly silt loam.	CL-ML, CL, GC, GM-GC	A-4	0-10	15-35	15-30	15-30	10-25	<25	4-10
	9-20	Very gravelly silt loam, extremely gravelly silt loam.	CL-ML, CL, GC, GM-GC	A-4	0-10	15-55	15-50	15-50	10-45	<25	4-10
	20-27	Extremely gravelly silty clay loam, very gravelly silt loam.	GC, GM-GC	A-2, A-4, A-6	0-20	15-60	15-55	15-55	10-50	20-30	5-15
	27-56	Clay, gravelly clay.	CH	A-7	0-15	45-70	45-75	40-75	35-70	50-70	30-40
	56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
87F*:											
Moko	0-4	Very flaggy silty clay loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-85	45-80	35-45	15-20
	4-10	Extremely stony silt loam, very flaggy loam, very stony silt loam.	CL, GC, SC	A-6, A-7	5-40	65-90	60-85	55-80	40-80	25-45	10-20
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Snead	0-2	Silty clay loam	CL	A-6, A-7	0-10	90-100	90-100	90-100	80-95	35-45	15-25
	2-39	Silty clay, clay, channery clay.	CH, CL	A-7	0-10	65-100	65-100	60-100	55-100	45-60	25-40
	39-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
88D*:											
Blueye	0-9	Gravelly silt loam.	CL-ML, CL, GC, SC	A-4, A-6	0-10	50-75	50-75	45-75	35-65	25-35	5-15
	9-14	Gravelly silt loam, very gravelly silt loam.	CL-ML, CL, GC, SC	A-4, A-6, A-2-4	0-10	40-75	35-75	30-75	25-70	25-35	5-15
	14-21	Silty clay, gravelly silty clay, gravelly clay.	CH, GC, SC	A-7	0-5	55-90	50-90	50-90	40-85	60-85	35-60
	21-39	Clay, gravelly clay.	CH, GC, SC	A-7	0-5	55-90	50-90	50-90	40-85	65-85	45-60
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Moko	0-3	Very flaggy loam	CL, GC, SC	A-6	40-65	65-90	60-85	55-75	40-75	25-35	10-15
	3-15	Very flaggy silt loam, very flaggy clay loam.	CL, GC, SC	A-6, A-7	40-80	65-90	60-85	55-80	40-80	25-45	10-20
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
89D*, 89F*:											
Mano	0-6	Very gravelly silt loam.	GM, GC, ML, CL	A-1, A-2, A-4	0-15	30-80	25-75	25-75	15-70	16-25	2-8
	6-17	Very gravelly silt loam, very gravelly silty clay loam.	GC	A-2, A-6	0-15	25-55	25-50	25-50	25-45	30-40	10-15
	17-60	Clay, silty clay, gravelly clay.	CH	A-7	0-5	70-95	70-95	65-90	55-85	50-75	30-45
Ocie	0-15	Very gravelly silt loam.	CL-ML, CL, SC, SC-SM	A-4, A-1, A-2	0-15	40-75	40-70	30-65	20-60	<25	4-10
	15-21	Very gravelly silty clay loam, very gravelly clay loam.	GC	A-2, A-6, A-7	5-30	40-55	20-50	20-45	15-40	35-50	15-30
	21-49	Gravelly clay, clay, silty clay.	CH	A-7	0-15	70-95	65-90	65-90	60-80	50-70	30-40
	49	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
91B	0-7	Silt loam	CL, CL-ML	A-4, A-6	0	90-100	75-100	70-95	60-75	20-30	5-11
Viraton	7-19	Silt loam, gravelly silty clay loam, silty clay loam.	GC, CL, SC	A-4, A-6	0-5	55-100	50-100	50-95	45-75	25-35	8-15
	19-30	Very gravelly silt loam, extremely gravelly silt loam.	GC, CL, SC	A-2, A-4, A-6	0-15	25-70	20-70	20-65	20-55	25-35	8-15
	30-60	Very gravelly clay, extremely gravelly clay, extremely gravelly silty clay.	GC	A-2, A-6, A-7	0-10	25-50	20-50	20-45	15-40	30-50	11-25
92A	0-8	Silt loam	ML	A-4	0-10	85-100	80-100	75-95	60-90	20-30	NP-7
Secesh	8-23	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-10	80-100	75-100	70-95	60-90	25-35	5-12
	23-60	Gravelly sandy clay, very gravelly silty clay loam, very gravelly sandy clay loam.	GC, SC	A-6, A-2-6	10-20	50-75	35-65	25-45	20-40	30-40	11-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
93B*:											
Waben	0-7	Very gravelly silt loam.	GM, GM-GC	A-1, A-2, A-4	0-10	30-55	25-50	25-50	15-45	10-25	NP-7
	7-27	Very gravelly silt loam, extremely gravelly silty clay loam.	GC, GM-GC, GP-GC	A-6, A-1, A-2, A-4	0-10	20-55	15-50	10-50	5-45	20-40	5-15
	27-60	Extremely gravelly silt loam, extremely gravelly loam, very gravelly silt loam.	GM, GM-GC, GP-GM, GC	A-1, A-2	0-10	20-55	15-40	10-35	5-30	15-30	3-11
Cedargap	0-8	Very gravelly silt loam.	SM, GM	A-1, A-2-4, A-4	2-15	40-85	30-75	20-60	15-50	25-35	3-9
	8-24	Extremely gravelly loam, extremely gravelly silt loam.	GC, GM-GC	A-2, A-2-6, A-1-b	0-20	25-50	20-45	15-40	15-35	20-35	5-20
	24-34	Extremely gravelly silty clay loam, extremely gravelly loam, very gravelly loam.	GC, GM-GC	A-2-4, A-2-6, A-1-b	0-20	25-50	20-45	15-40	15-35	20-35	5-20
	34-60	Very gravelly silty clay loam, extremely gravelly clay loam, extremely gravelly loam.	GC	A-2-6	0-20	25-50	20-45	15-40	15-35	30-40	11-20
94B--Hercules	0-11	Very gravelly silty clay loam.	GC	A-2, A-6, A-7	0	35-60	25-50	20-50	15-50	30-45	11-20
	11-22	Very gravelly silty clay, very gravelly silty clay loam.	GC	A-2, A-7	0	35-55	30-50	30-50	25-50	45-60	20-30
	22-44	Very gravelly clay, extremely gravelly silty clay, extremely gravelly clay.	GC, GP-GC	A-2, A-7	0	20-50	15-45	15-45	10-45	45-65	25-40
	44-60	Extremely gravelly clay loam, very gravelly clay loam, extremely gravelly silty clay.	GC, GP-GC	A-2	0-15	20-40	10-30	10-30	10-25	40-65	20-40
96*:											
Pits.											
Dumps.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
11B	0-18	15-27	1.30-1.50	0.6-2.0	0.18-0.23	4.5-7.3	Low	0.32	5	2-4
Pembroke	18-38	27-35	1.30-1.50	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.28		
	38-60	36-60	1.35-1.65	0.6-2.0	0.13-0.19	4.5-6.0	Moderate	0.28		
15C	0-9	12-27	1.20-1.40	2.0-6.0	0.10-0.19	4.5-7.3	Low	0.28	2	.5-1
Scholten	9-24	27-40	1.30-1.50	0.6-2.0	0.07-0.14	3.6-6.0	Low	0.32		
	24-33	20-35	1.60-1.90	<0.06	0.01-0.05	3.6-5.0	Moderate	0.32		
	33-60	40-80	1.30-1.60	2.0-6.0	0.02-0.06	3.6-5.0	Moderate	0.20		
16B	0-10	10-25	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.32	4	2-3
Creldon	10-27	35-45	1.30-1.50	0.2-0.6	0.12-0.17	4.5-6.5	Moderate	0.32		
	27-50	25-35	1.60-1.85	<0.06	0.05-0.12	3.6-5.0	Low	0.43		
	50-60	40-70	1.30-1.55	0.6-2.0	0.04-0.10	4.5-6.0	High	0.32		
18B	0-9	15-24	1.30-1.50	0.6-2.0	0.22-0.24	4.5-6.5	Low	0.43	3	1-2
Captina	9-24	20-40	1.30-1.50	0.6-2.0	0.18-0.22	3.6-5.5	Low	0.43		
	24-60	20-35	1.60-1.90	0.06-0.2	0.04-0.10	3.6-5.5	Low	0.37		
19B	0-5	15-25	1.20-1.40	0.6-2.0	0.18-0.24	4.5-7.3	Low	0.37	4	1-2
Needleye	5-23	25-35	1.25-1.45	0.2-0.6	0.12-0.20	3.6-5.5	Low	0.37		
	23-44	20-30	1.60-1.90	<0.06	0.02-0.06	3.6-5.5	Low	0.20		
	44-60	40-75	1.10-1.40	0.6-2.0	0.03-0.08	3.6-5.5	Moderate	0.20		
20B	0-4	10-20	1.25-1.45	0.6-2.0	0.22-0.24	5.1-6.5	Low	0.32	5	1-2
Branson	4-12	10-20	1.30-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low	0.37		
	12-24	20-34	1.25-1.45	0.6-2.0	0.18-0.24	4.5-6.5	Low	0.43		
	24-58	30-45	1.25-1.40	0.6-2.0	0.08-0.20	3.6-5.0	Moderate	0.32		
	58-60	40-65	1.10-1.30	0.6-2.0	0.05-0.10	3.6-5.0	Moderate	0.32		
21B	0-8	18-27	1.30-1.45	0.6-2.0	0.18-0.22	4.5-7.3	Low	0.37	5	1-2
Claiborne	8-30	22-30	1.35-1.50	0.6-2.0	0.16-0.20	4.5-5.5	Low	0.32		
	30-60	27-35	1.35-1.55	0.6-2.0	0.09-0.14	4.5-5.5	Low	0.32		
22B	0-6	15-25	1.35-1.45	0.6-2.0	0.11-0.16	4.5-6.5	Low	0.32	4	.5-1
Britwater	6-21	18-34	1.35-1.45	0.6-2.0	0.12-0.18	4.5-6.5	Low	0.28		
	21-60	27-50	1.30-1.45	0.6-2.0	0.08-0.16	4.5-6.0	Low	0.28		
23B*:										
Lily	0-9	5-18	1.20-1.40	2.0-6.0	0.13-0.18	3.6-5.5	Low	0.28	2	.5-1
	9-24	18-35	1.20-1.40	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.28		
	24	---	---	0.0-0.2	---	---	---	---		
Ramsey	0-4	8-25	1.25-1.50	6.0-20	0.09-0.12	4.5-5.5	Low	0.20	1	.5-1
	4-11	8-25	1.20-1.40	6.0-20	0.09-0.12	4.5-5.5	Low	0.17		
	11	---	---	0.0-0.2	---	---	---	---		
24A*:										
Parsons	0-11	15-25	1.30-1.50	0.6-2.0	0.16-0.24	5.1-6.5	Low	0.49	4	1-2
	11-60	35-60	1.40-1.70	<0.06	0.10-0.18	5.1-7.8	High	0.43		
Barden	0-12	15-27	1.40-1.50	0.6-2.0	0.21-0.24	5.1-7.3	Low	0.37	3	1-2
	12-27	28-35	1.35-1.45	0.2-0.6	0.18-0.20	4.5-6.5	Moderate	0.37		
	27-40	36-55	1.25-1.40	0.06-0.2	0.11-0.19	4.5-6.5	High	0.37		
	40-60	28-40	1.30-1.45	0.2-0.6	0.10-0.14	4.5-6.5	Moderate	0.37		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
24A*:										
Carytown	0-10	12-25	1.20-1.40	0.6-2.0	0.19-0.24	5.1-7.3	Low	0.43	3	.5-1
	10-16	12-27	1.20-1.40	0.6-2.0	0.19-0.24	5.1-7.3	Low	0.43		
	16-60	40-60	1.45-1.65	<0.06	0.08-0.11	5.6-8.4	High	0.43		
26B2	0-8	5-20	1.20-1.40	0.6-2.0	0.16-0.21	5.6-6.5	Low	0.43	4	.5-1
Yelton	8-20	20-35	1.30-1.50	0.6-2.0	0.14-0.21	3.6-5.5	Low	0.37		
	20-56	20-30	1.60-1.90	0.06-0.2	0.03-0.05	3.6-5.5	Low	0.28		
	56-60	20-60	1.10-1.40	0.2-0.6	0.06-0.10	3.6-5.5	Moderate	0.28		
27E	0-4	10-20	1.10-1.30	2.0-6.0	0.13-0.16	4.5-6.5	Low	0.32	3	1-2
Beemont	4-10	10-20	1.10-1.30	2.0-6.0	0.13-0.24	4.5-6.5	Low	0.32		
	10-44	60-85	1.35-1.55	<0.06	0.07-0.13	4.5-5.5	High	0.28		
	44-49	20-35	1.30-1.55	0.06-0.2	0.08-0.15	4.5-5.5	High	0.28		
	49	---	---	---	---	---	---	---		
28C	0-8	10-27	1.20-1.35	2.0-6.0	0.20-0.22	4.5-6.5	Low	0.32	3	1-2
Beemont	8-45	60-85	1.35-1.45	<0.06	0.09-0.12	4.5-5.5	High	0.32		
	45	---	---	0.2-2.0	---	---	---	---		
29C	0-7	7-20	1.35-1.60	0.6-2.0	0.11-0.15	5.1-6.5	Low	0.24	5	2-3
Portia	7-16	18-35	1.35-1.60	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.32		
	16-60	20-40	1.35-1.60	0.6-2.0	0.10-0.17	4.5-6.0	Low	0.32		
30C	0-10	15-25	1.30-1.60	2.0-6.0	0.06-0.13	4.5-7.3	Low	0.24	3	2-3
Keeno	10-23	27-35	1.30-1.50	0.6-2.0	0.02-0.10	3.6-5.5	Low	0.15		
	23-31	25-35	1.60-1.90	0.06-0.2	0.01-0.05	3.6-5.5	Low	0.10		
	31-60	35-80	1.30-1.50	2.0-6.0	0.04-0.08	4.5-5.5	Moderate	0.15		
31C	0-5	5-20	1.20-1.50	2.0-6.0	0.09-0.13	5.1-6.5	Low	0.28	5	1-2
Waben	5-60	15-35	1.30-1.60	2.0-6.0	0.05-0.15	5.1-6.5	Low	0.24		
35D*:										
Hailey	0-6	10-15	1.20-1.40	6.0-20	0.05-0.14	5.1-6.0	Low	0.28	3	.5-1
	6-60	10-20	1.20-1.40	6.0-20	0.02-0.11	4.5-6.0	Low	0.28		
Nixa	0-3	12-25	1.30-1.50	0.6-2.0	0.08-0.11	4.5-5.5	Low	0.32	3	.5-1
	3-12	12-25	1.30-1.50	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.32		
	12-24	20-35	1.30-1.50	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.32		
	24-37	20-35	1.40-1.60	<0.06	0.05-0.08	4.5-5.5	Low	0.32		
	37-60	30-50	1.35-1.45	0.6-2.0	0.03-0.05	4.5-5.5	Moderate	0.32		
36D*:										
Nixa	0-3	12-25	1.30-1.50	0.6-2.0	0.08-0.11	4.5-5.5	Low	0.32	3	.5-1
	3-9	12-25	1.30-1.50	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.32		
	9-20	20-35	1.30-1.50	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.32		
	20-36	20-35	1.40-1.60	<0.06	0.05-0.08	4.5-5.5	Low	0.32		
	36-60	30-50	1.35-1.45	0.6-2.0	0.03-0.05	4.5-5.5	Moderate	0.32		
Clarksville	0-10	14-20	1.20-1.40	2.0-6.0	0.07-0.12	3.6-6.0	Low	0.28	3	.5-1
	10-29	25-35	1.30-1.45	2.0-6.0	0.06-0.10	3.6-5.5	Low	0.32		
	29-60	40-75	1.20-1.40	0.6-2.0	0.05-0.08	3.6-5.5	High	0.20		
40D*:										
Noark	0-3	10-25	1.35-1.55	0.6-2.0	0.10-0.12	4.5-6.5	Low	0.28	3	.5-1
	3-9	10-25	1.35-1.55	0.6-2.0	0.10-0.16	4.5-6.5	Low	0.28		
	9-13	20-40	1.35-1.55	0.6-2.0	0.10-0.12	3.6-5.5	Low	0.28		
	13-22	40-70	1.25-1.40	0.6-2.0	0.08-0.12	3.6-5.5	Moderate	0.24		
	22-60	45-75	1.25-1.40	0.6-2.0	0.03-0.18	3.6-5.5	Moderate	0.24		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
40D*:										
Clarksville	0-11	14-20	1.20-1.40	2.0-6.0	0.07-0.12	3.6-6.0	Low	0.28	3	.5-1
	11-36	25-35	1.30-1.45	2.0-6.0	0.06-0.10	3.6-5.5	Low	0.32		
	36-60	40-75	1.20-1.40	0.6-2.0	0.05-0.08	3.6-5.5	High	0.20		
41E	0-4	10-25	1.35-1.55	0.6-2.0	0.10-0.12	4.5-6.5	Low	0.28	3	.5-1
Noark	4-10	10-25	1.35-1.55	0.6-2.0	0.10-0.16	4.5-6.5	Low	0.28		
	10-25	20-40	1.35-1.55	0.6-2.0	0.10-0.12	3.6-5.5	Low	0.28		
	25-40	40-70	1.25-1.40	0.6-2.0	0.08-0.12	3.6-5.5	Moderate	0.24		
	40-60	45-75	1.25-1.40	0.6-2.0	0.03-0.18	3.6-5.5	Moderate	0.24		
44G*:										
Hailey	0-11	10-15	1.20-1.40	6.0-20	0.05-0.14	5.1-6.0	Low	0.28	3	.5-1
	11-60	10-20	1.20-1.40	6.0-20	0.02-0.11	4.5-6.0	Low	0.28		
Rock outcrop.										
Moko	0-3	18-27	1.25-1.60	0.6-2.0	0.08-0.13	6.6-7.8	Low	0.24	1	2-4
	3-10	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.28		
	10	---	---	0.00-0.2	---	---		----		
45F	0-16	14-20	1.20-1.40	2.0-6.0	0.07-0.12	3.6-6.0	Low	0.28	3	.5-1
Clarksville	16-48	25-35	1.30-1.45	2.0-6.0	0.06-0.10	3.6-5.5	Low	0.32		
	48-60	40-75	1.20-1.40	0.6-2.0	0.05-0.08	3.6-5.5	High	0.20		
46G*:										
Clarksville	0-10	14-20	1.20-1.40	2.0-6.0	0.07-0.12	3.6-6.0	Low	0.28	3	.5-1
	10-41	25-35	1.30-1.45	2.0-6.0	0.06-0.10	3.6-5.5	Low	0.32		
	41-60	40-75	1.20-1.40	0.6-2.0	0.05-0.08	3.6-5.5	High	0.20		
Rock outcrop.										
Moko	0-3	18-27	1.25-1.60	0.6-2.0	0.08-0.13	6.6-7.8	Low	0.24	1	2-4
	3-10	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.28		
	10	---	---	0.00-0.2	---	---		----		
50C	0-3	12-25	1.30-1.50	0.6-2.0	0.08-0.11	4.5-6.0	Low	0.32	3	.5-1
Nixa	3-10	12-25	1.30-1.50	0.6-2.0	0.08-0.16	4.5-6.0	Low	0.32		
	10-24	20-35	1.30-1.50	0.6-2.0	0.07-0.12	4.5-5.5	Low	0.32		
	24-39	20-35	1.40-1.60	<0.06	0.05-0.08	4.5-5.5	Low	0.32		
	39-60	30-50	1.35-1.45	0.6-2.0	0.03-0.05	4.5-5.5	Moderate	0.32		
51B*:										
Tonti	0-11	10-25	1.30-1.50	0.6-2.0	0.16-0.20	4.5-6.5	Low	0.37	3	1-2
	11-25	20-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-6.0	Low	0.32		
	25-42	18-35	1.60-1.90	0.06-0.2	0.02-0.08	3.6-5.0	Low	0.28		
	42-60	40-80	1.20-1.40	0.6-2.0	0.05-0.10	3.6-5.0	Moderate	0.32		
Scholten	0-12	12-27	1.20-1.40	2.0-6.0	0.10-0.19	4.5-7.3	Low	0.28	2	1-2
	12-20	27-40	1.30-1.50	0.6-2.0	0.07-0.14	3.6-6.0	Low	0.32		
	20-35	20-35	1.60-1.90	<0.06	0.01-0.05	3.6-5.0	Moderate	0.32		
	35-60	40-80	1.30-1.60	2.0-6.0	0.02-0.06	3.6-5.0	Moderate	0.20		
54	0-13	12-27	1.20-1.40	0.6-2.0	0.19-0.23	5.6-7.8	Low	0.37	5	2-4
Dunning	13-60	35-60	1.40-1.65	0.06-0.2	0.14-0.18	5.6-7.8	Moderate	0.28		
55*:										
Elk	0-19	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low	0.37	5	2-4
	19-41	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low	0.28		
	41-60	15-40	1.20-1.50	0.6-2.0	0.14-0.20	4.5-6.5	Low	0.28		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
55*:										
Huntington	0-10	18-30	1.10-1.30	0.6-2.0	0.18-0.24	5.6-7.8	Low	0.28	5	4-6
	10-60	18-30	1.30-1.50	0.6-2.0	0.16-0.22	5.6-7.8	Low	0.32		
61B	0-8	15-25	1.20-1.40	0.6-2.0	0.17-0.22	5.1-7.3	Low	0.37	4	2-3
Hoberg	8-18	20-30	1.25-1.45	0.6-2.0	0.15-0.20	5.1-7.3	Low	0.37		
	18-24	20-30	1.30-1.50	0.6-2.0	0.09-0.14	5.1-6.5	Low	0.24		
	24-48	20-30	1.60-1.90	0.06-0.2	0.01-0.05	3.6-6.0	Low	0.15		
	48-60	40-70	1.10-1.40	0.6-2.0	0.02-0.06	3.6-6.0	High	0.10		
76	0-9	20-27	1.30-1.50	0.2-0.6	0.22-0.24	4.5-7.3	Moderate	0.37	3	.5-1
Racoon	9-30	18-25	1.35-1.50	0.2-0.6	0.20-0.22	4.5-7.3	Moderate	0.37		
	30-60	27-35	1.35-1.60	0.06-0.2	0.18-0.20	4.5-5.5	High	0.37		
81B	0-8	10-25	1.30-1.50	0.6-2.0	0.16-0.20	5.6-6.5	Low	0.37	3	1-2
Tonti	8-26	20-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-6.0	Low	0.32		
	26-60	18-35	1.60-1.90	0.06-0.2	0.02-0.08	3.6-5.0	Low	0.28		
82B*:										
Rock outcrop.										
Lithic Udorthents.										
83F*:										
Moko	0-3	27-35	1.25-1.50	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.24	1	2-4
	3-10	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.28		
	10	---	---	0.00-0.2	---	---	---	---		
Rock outcrop.										
83G*:										
Rock outcrop.										
Moko	0-4	18-27	1.25-1.60	0.6-2.0	0.08-0.13	6.6-7.8	Low	0.24	1	2-4
	4-9	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.28		
	9	---	---	0.00-0.2	---	---	---	---		
84D*:										
Bardley	0-2	25-35	1.40-1.55	0.6-2.0	0.12-0.17	4.5-6.5	Moderate	0.28	3	.5-1
	2-8	25-35	1.40-1.55	0.6-2.0	0.04-0.08	4.5-6.5	Low	0.32		
	8-38	50-85	1.20-1.40	0.6-2.0	0.08-0.12	4.5-7.3	Moderate	0.28		
	38	---	0.01-0.06	0.01-0.06	---	---	---	---		
Moko	0-3	18-27	1.25-1.60	0.6-2.0	0.08-0.13	6.6-7.8	Low	0.24	1	2-4
	3-10	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.28		
	10	---	---	0.00-0.2	---	---	---	---		
Rock outcrop.										
85D*:										
Moko	0-3	18-27	1.25-1.60	0.6-2.0	0.08-0.13	6.6-7.8	Low	0.24	1	2-4
	3-10	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.28		
	10	---	---	0.00-0.2	---	---	---	---		
Rock outcrop.										
Blueye	0-12	15-32	1.20-1.30	0.6-2.0	0.10-0.16	6.6-7.8	Low	0.28	2	2-4
	12-18	15-35	1.25-1.40	0.6-2.0	0.08-0.14	6.6-8.4	Low	0.37		
	18-39	60-85	1.20-1.40	<0.06	0.03-0.08	7.9-8.4	High	0.24		
	39	---	---	0.00-0.06	---	---	---	---		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
85F*:										
Moko	0-8	27-35	1.25-1.50	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.24	1	2-4
	8-16	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.28		
	16	---	---	0.00-0.2	---	---		----		
Blueye	0-11	15-32	1.20-1.30	0.6-2.0	0.10-0.16	6.6-7.8	Low	0.28	2	2-4
	11-23	15-35	1.25-1.40	0.6-2.0	0.08-0.14	6.6-8.4	Low	0.37		
	23-30	55-85	1.20-1.45	0.06-0.2	0.04-0.09	6.6-8.4	High	0.24		
	30-37	60-85	1.20-1.40	<0.06	0.03-0.08	7.9-8.4	High	0.24		
	37	---	---	0.00-0.06	---	---		----		
Rock outcrop.										
86D*:										
Mano	0-13	10-20	1.20-1.40	2.0-6.0	0.09-0.20	4.5-7.3	Low	0.28	4	.5-1
	13-33	20-35	1.30-1.40	0.6-2.0	0.04-0.14	4.5-6.5	Low	0.32		
	33-68	45-80	1.30-1.60	0.06-0.2	0.06-0.12	6.6-8.4	High	0.28		
Gatewood	0-9	15-25	1.10-1.40	0.6-2.0	0.14-0.20	5.6-7.3	Low	0.28	3	.5-1
	9-39	60-85	1.35-1.60	0.06-0.2	0.06-0.10	5.6-7.3	High	0.28		
	39	---	---	0.01-0.06	---	---		----		
86F*:										
Mano	0-13	10-20	1.20-1.40	2.0-6.0	0.09-0.20	4.5-7.3	Low	0.28	4	.5-1
	13-22	20-35	1.30-1.40	0.6-2.0	0.04-0.06	4.5-6.5	Low	0.32		
	22-33	20-35	1.30-1.40	0.6-2.0	0.04-0.14	4.5-6.5	Low	0.32		
	33-60	45-80	1.30-1.60	0.06-0.2	0.06-0.12	6.6-8.4	High	0.28		
Ocie	0-9	10-20	1.10-1.40	0.6-2.0	0.12-0.17	4.5-6.5	Low	0.32	3	.5-1
	9-20	10-20	1.10-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Low	0.32		
	20-27	18-30	1.10-1.40	0.6-2.0	0.09-0.12	4.5-6.5	Moderate	0.32		
	27-56	55-80	1.10-1.30	0.06-0.2	0.07-0.10	5.1-6.5	High	0.28		
	56	---	---	0.01-0.06	---	---		----		
87F*:										
Moko	0-4	27-35	1.25-1.50	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.24	1	2-4
	4-10	18-35	1.25-1.60	0.6-2.0	0.09-0.14	6.6-7.8	Low	0.28		
	10	---	---	0.00-0.2	---	---		----		
Snead	0-2	27-40	1.30-1.40	0.2-0.6	0.21-0.24	6.1-8.4	Moderate	0.37	3	2-4
	2-39	40-60	1.25-1.35	0.06-0.2	0.12-0.14	6.6-8.4	High	0.32		
	39-60	---	---	0.01-0.2	---	---		----		
Rock outcrop.										
88D*:										
Blueye	0-9	15-32	1.20-1.30	0.6-2.0	0.10-0.16	6.6-7.8	Low	0.28	2	2-4
	9-14	15-35	1.25-1.40	0.6-2.0	0.08-0.14	6.6-8.4	Low	0.37		
	14-21	55-85	1.20-1.45	0.06-0.2	0.04-0.09	6.6-8.4	High	0.24		
	21-39	60-85	1.20-1.40	<0.06	0.03-0.08	7.9-8.4	High	0.24		
	39	---	---	0.00-0.06	---	---		----		
Moko	0-3	18-27	1.25-1.60	0.6-2.0	0.07-0.13	6.6-7.8	Low	0.24	1	2-4
	3-15	18-35	1.25-1.60	0.6-2.0	0.03-0.14	6.6-7.8	Low	0.28		
	15	---	---	0.00-0.2	---	---		----		
89D*, 89F*:										
Mano	0-6	10-20	1.20-1.40	2.0-6.0	0.04-0.13	4.5-7.3	Low	0.28	3	.5-1
	6-17	20-35	1.30-1.40	0.6-2.0	0.04-0.14	4.5-6.5	Low	0.32		
	17-60	45-80	1.30-1.60	0.06-0.2	0.06-0.12	6.6-8.4	High	0.28		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
89D*, 89F*:										
Ocie	0-15	10-20	1.10-1.40	0.6-2.0	0.12-0.17	4.5-6.5	Low	0.32	3	.5-1
	15-21	25-35	1.10-1.30	0.2-0.6	0.09-0.12	4.5-6.0	Moderate	0.32		
	21-49	50-80	1.10-1.30	0.06-0.2	0.07-0.10	5.1-7.3	High	0.32		
	49	---	---	0.01-0.06	---	---				
91B	0-7	15-25	1.30-1.50	0.6-2.0	0.18-0.22	4.5-7.3	Low	0.43	4	1-2
Viraton	7-19	18-35	1.30-1.50	0.6-2.0	0.08-0.16	4.5-6.0	Low	0.43		
	19-30	18-30	1.60-1.90	<0.06	0.01-0.05	3.6-5.5	Low	0.32		
	30-60	30-60	1.10-1.40	0.2-0.6	0.06-0.10	4.5-7.3	Moderate	0.24		
92A	0-8	15-25	1.10-1.30	0.6-2.0	0.16-0.20	5.1-6.5	Low	0.32	4	1-2
Secesh	8-23	20-30	1.20-1.40	0.6-2.0	0.13-0.19	4.5-6.5	Low	0.32		
	23-60	25-35	1.30-1.50	0.6-2.0	0.05-0.09	4.5-6.0	Low	0.24		
93B*:										
Waben	0-7	5-20	1.20-1.50	2.0-6.0	0.09-0.13	5.1-6.5	Low	0.28	5	1-2
	7-27	15-35	1.30-1.60	2.0-6.0	0.05-0.15	5.1-6.5	Low	0.24		
	27-60	10-27	1.30-1.60	2.0-6.0	0.05-0.15	5.1-6.5	Low	0.24		
Cedargap	0-8	12-25	1.20-1.45	0.6-2.0	0.11-0.18	5.6-7.3	Low	0.24	5	2-4
	8-24	12-35	1.40-1.55	0.6-2.0	0.04-0.10	5.6-7.3	Low	0.10		
	24-34	18-35	1.40-1.55	0.6-2.0	0.04-0.12	5.6-7.3	Low	0.10		
	34-60	25-35	1.40-1.55	0.6-2.0	0.04-0.12	5.6-7.3	Low	0.10		
94B	0-11	20-35	1.25-1.40	2.0-6.0	0.08-0.16	6.1-7.3	Low	0.24	5	2-3
Hercules	11-22	35-40	1.45-1.55	0.6-2.0	0.04-0.13	6.1-7.3	Moderate	0.28		
	22-44	40-60	1.45-1.60	0.2-0.6	0.02-0.08	6.1-7.8	Moderate	0.24		
	44-60	30-60	1.40-1.60	0.6-2.0	0.02-0.10	6.1-7.8	Moderate	0.24		
96*:										
Pits.										
Dumps.										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
11B---------- Pembroke	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
15C---------- Scholten	C	None	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	Moderate	Moderate	High.
16B---------- Creldon	C	None	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High-----	High.
18B---------- Captina	C	None	---	---	2.0-3.0	Perched	Dec-Apr	>60	---	---	Moderate	High.
19B---------- Needleye	C	None	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	Moderate	High.
20B---------- Branson	B	None	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
21B---------- Claiborne	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
22B---------- Britwater	B	None	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
23B*:												
Lily----------	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	High.
Ramsey----------	D	None	---	---	>6.0	---	---	10-20	Hard	---	Low------	Moderate.
24A*:												
Parsons----------	D	None	---	---	0.5-1.5	Perched	Dec-Apr	>60	---	---	High-----	Moderate.
Barden----------	C	None	---	---	2.0-3.0	Perched	Nov-Mar	>60	---	---	High-----	Moderate.
Carytown----------	D	None	---	---	0-1.0	Perched	Dec-Apr	>60	---	---	High-----	Moderate.
26B2---------- Yelton	C	None	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	Moderate	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
27E, 28C---------- Beemont	C	None---------	---	---	4.0-6.0	Perched	Dec-Mar	40-60	Hard	Moderate	High-----	High.
29C---------- Portia	C	None---------	---	---	>6.0	---	---	>60	---	---	High-----	High.
30C---------- Keeno	C	None---------	---	---	1.5-2.5	Perched	Dec-Mar	>60	---	Moderate	Moderate	High.
31C---------- Waben	B	None---------	---	---	>6.0	---	---	>60	---	---	Low------	Moderate.
35D*: Hailey---------- Nixa----------	B C	None--------- None---------	--- ---	--- ---	>6.0 1.0-2.5	--- Perched	--- Dec-Mar	>60 >60	--- ---	Moderate ---	Low------ Moderate	Moderate. Moderate.
36D*: Nixa---------- Clarksville------	C B	None--------- None---------	--- ---	--- ---	1.0-2.5 >6.0	Perched ---	Dec-Mar ---	>60 >60	--- ---	--- Moderate	Moderate Low------	Moderate. High.
40D*: Noark---------- Clarksville------	B B	None--------- None---------	--- ---	--- ---	>6.0 >6.0	--- ---	--- ---	>60 >60	--- ---	--- Moderate	Moderate Low------	High. High.
41E---------- Noark	B	None---------	---	---	>6.0	---	---	>60	---	---	Moderate	High.
44G*: Hailey---------- Rock outcrop. Moko----------	B D	None--------- None---------	--- ---	--- ---	>6.0 >6.0	--- ---	--- ---	>60 6-20	--- Hard	Moderate ---	Low------ Low------	Moderate. Low.
45F---------- Clarksville	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
46G*:												
Clarksville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
Rock outcrop.												
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	---	Low	Low.
50C	C	None	---	---	1.0-2.5	Perched	Dec-Mar	>60	---	---	Moderate	Moderate.
Nixa												
51B*:												
Tonti	C	None	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	---	High	High.
Scholten	C	None	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	Moderate	Moderate	High.
54	D	Frequent	Brief	Dec-May	0-0.5	Apparent	Jan-Apr	>60	---	---	High	Moderate.
Dunning												
55*:												
Elk	B	Occasional	Brief	Jan-Jun	>6.0	---	---	>60	---	---	Moderate	Moderate.
Huntington	B	Frequent	Brief	Dec-May	>6.0	---	---	>60	---	High	Low	Moderate.
61B	C	None	---	---	1.0-3.0	Perched	Dec-Mar	>60	---	Moderate	Moderate	High.
Hoberg												
76	C/D	Occasional	Brief	Mar-May	+.5-1.0	Apparent	Mar-Jun	>60	---	High	High	High.
Racoon												
81B	C	None	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	---	High	High.
Tonti												
82B*:												
Rock outcrop.												
Lithic Udorthents.												
83F*:												
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	---	Low	Low.
Rock outcrop.												

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
83G*:												
Rock outcrop.												
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	---	Low	Low.
84D*:												
Bardley	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	---	Low	Low.
Rock outcrop.												
85D*:												
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	---	Low	Low.
Rock outcrop.												
Blueye	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Moderate.
85F*:												
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	---	Low	Low.
Blueye	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Moderate.
Rock outcrop.												
86D*:												
Mano	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Gatewood	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Moderate.
86F*:												
Mano	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Ocie	C	None	---	---	>6.0	---	---	40-60	Hard	Moderate	High	Moderate.
87F*:												
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	---	Low	Low.
Snead	D	None	---	---	2.0-3.0	Perched	Dec-Mar	20-40	Soft	Moderate	High	Low.
Rock outcrop.												

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
88D*:												
Blueye	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Moderate.
Moko	D	None	---	---	>6.0	---	---	6-20	Hard	---	Low	Low.
89D*, 89F*:												
Mano	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Ocie	C	None	---	---	>6.0	---	---	40-60	Hard	Moderate	High	Moderate.
91B Viraton	C	None	---	---	1.5-2.5	Perched	Dec-Mar	>60	---	Moderate	Moderate	High.
92A Secesh	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
93B*:												
Waben	B	Rare	---	---	>6.0	---	---	>60	---	---	Low	Moderate.
Cedargap	B	Frequent	Very brief	Nov-May	>6.0	---	---	>60	---	Moderate	Low	Low.
94B Hercules	C	Occasional	Very brief	Nov-May	>6.0	---	---	>60	---	Moderate	High	Low.
96*:												
Pits.												
Dumps.												

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Barden	Fine, mixed, thermic Aquollic Hapludalfs
Bardley	Very fine, mixed, mesic Typic Hapludalfs
Beemont	Very fine, montmorillonitic, mesic Typic Hapludalfs
Blueye	Very fine, mixed, mesic Typic Argiudolls
Branson	Fine-silty, mixed, mesic Typic Paleudults
Britwater	Fine-loamy, mixed, mesic Typic Paleudalfs
Captina	Fine-silty, siliceous, mesic Typic Fragiudults
Carytown	Fine, mixed, thermic Albic Natraqualfs
Cedargap	Loamy-skeletal, mixed, mesic Cumulic Hapludolls
Claiborne	Fine-loamy, siliceous, mesic Typic Paleudults
Clarksville	Loamy-skeletal, siliceous, mesic Typic Paleudults
Creldon	Fine, mixed, mesic Mollic Fragiudalfs
Dunning	Fine, mixed, mesic Fluvaquentic Haplaquolls
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Gatewood	Very fine, mixed, mesic Typic Hapludalfs
Hailey	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Hercules	Clayey-skeletal, mixed, mesic Cumulic Hapludolls
Hoberg	Fine-loamy, siliceous, mesic Mollic Fragiudalfs
Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
*Keeno	Loamy-skeletal, siliceous, mesic Mollic Fragiudalfs
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Lithic Udorthents	Udorthents
Mano	Loamy-skeletal over clayey, mixed, mesic Typic Hapludalfs
Moko	Loamy-skeletal, mixed, mesic Lithic Hapludolls
Needleye	Fine-silty, mixed, mesic Aquic Fragiudults
Nixa	Loamy-skeletal, siliceous, mesic Glossic Fragiudults
Noark	Clayey-skeletal, mixed, mesic Typic Paleudults
Ocie	Loamy-skeletal over clayey, mixed, mesic Typic Hapludalfs
Parsons	Fine, mixed, thermic Mollic Albaqualfs
Pembroke	Fine-silty, mixed, mesic Mollic Paleudalfs
*Portia	Fine-loamy, siliceous, mesic Typic Paleudalfs
Racoon	Fine-silty, mixed, mesic Typic Ochraqualfs
Ramsey	Loamy, siliceous, mesic Lithic Dystrochrepts
Scholten	Loamy-skeletal, siliceous, mesic Typic Fragiudults
Secesh	Fine-loamy, siliceous, mesic Ultic Hapludalfs
Snead	Fine, mixed, mesic Aquic Hapludolls
Tonti	Fine-loamy, mixed, mesic Typic Fragiudults
Viraton	Fine-loamy, siliceous, mesic Typic Fragiudalfs
Waben	Loamy-skeletal, siliceous, mesic Ultic Hapludalfs
Yelton	Fine-loamy, siliceous, mesic Typic Fragiudults

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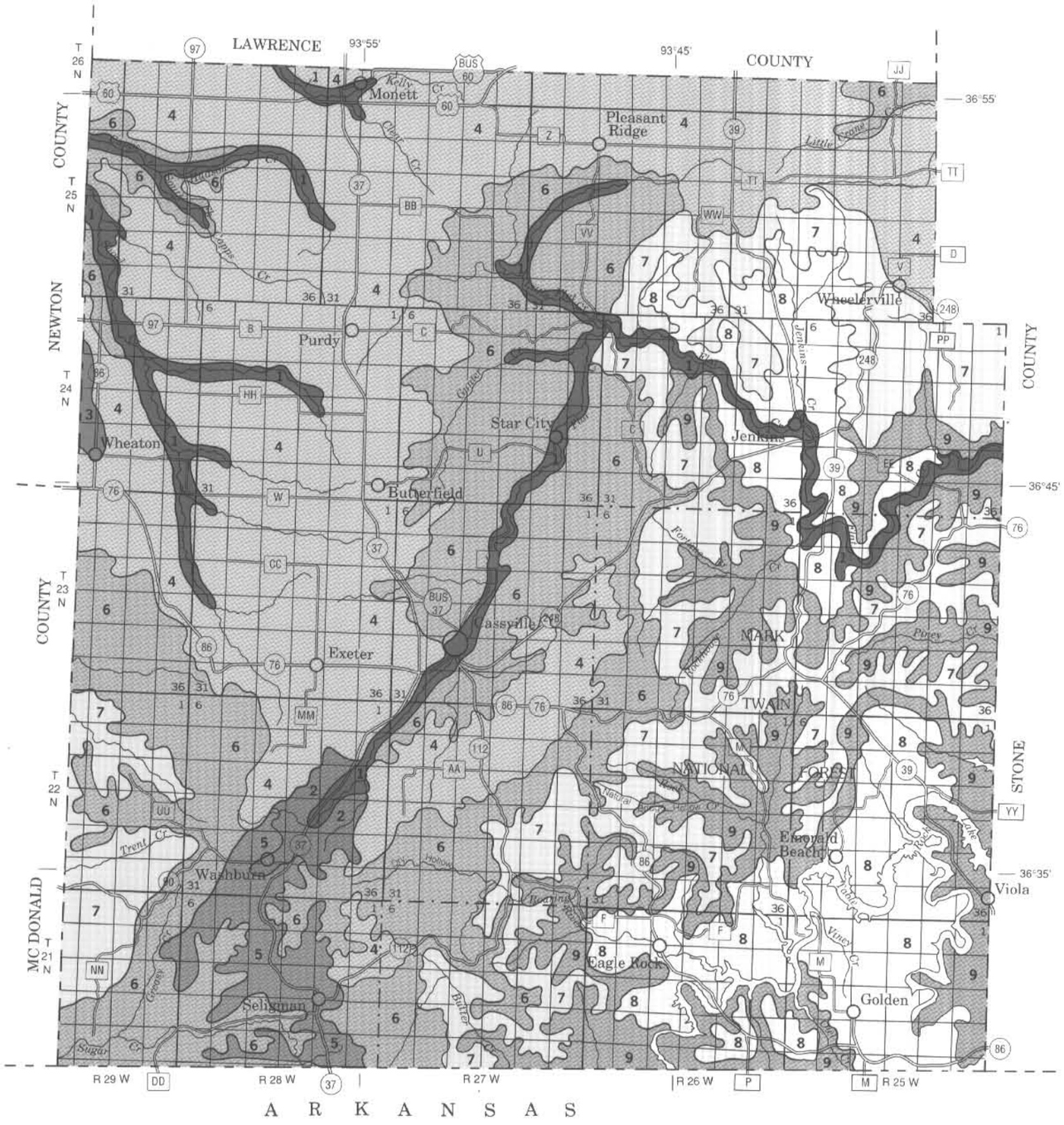


Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL LEGEND*

DOMINANTLY NEARLY LEVEL TO MODERATELY STEEP SOILS IN THE OZARK BORDER AREA

- 1 Secesh-Claiborne association
- 2 Branson-Pembroke association
- 3 Hoberg-Creldon-Keeno association
- 4 Scholten-Tonti association
- 5 Beemont-Yelton-Lily association

DOMINANTLY MODERATELY SLOPING TO VERY STEEP SOILS IN THE OZARK HIGHLAND AREA

- 6 Clarksville-Noark-Nixa association
- 7 Hailey-Rock outcrop association
- 8 Mano-Gatewood-Britwater association
- 9 Mano-Moko-Rock outcrop association

*The units on this legend are described in the text under the heading "General Soil Map Units."

Compiled 1992

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
MISSOURI AGRICULTURAL EXPERIMENT STATION

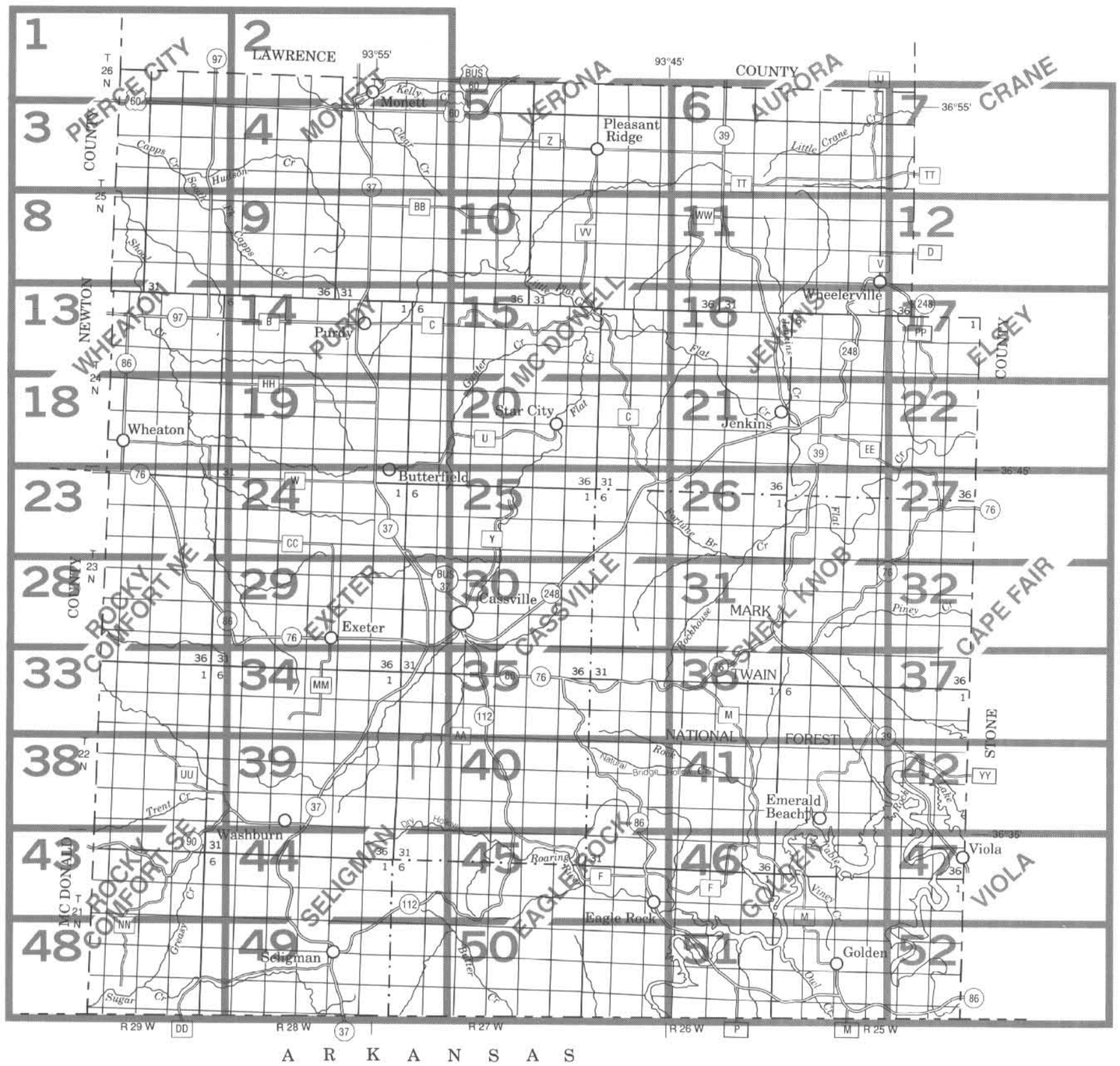
GENERAL SOIL MAP

BARRY COUNTY, MISSOURI

Scale 1:253,440

1 0 1 2 3 4 Mi

1 0 4 8 Km



6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

N

General Soil Map

Welcome Page

Manuscript

Legend

INDEX TO MAP SHEETS

BARRY COUNTY, MISSOURI

Scale 1:253,440

1 0 1 2 3 4 Mi

1 0 4 8 Km

SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kind of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 following the slope letter indicates that the soil is eroded.

11B	Pembroke silt loam, 1 to 3 percent slopes
15C	Scholton gravelly silt loam, 3 to 9 percent slopes
16B	Creldon silt loam, 1 to 3 percent slopes
18B	Captina silt loam, 1 to 3 percent slopes
19B	Needleye silt loam, 1 to 3 percent slopes
20B	Branson silt loam, 1 to 3 percent slopes
21B	Claiborne silt loam, 2 to 5 percent slopes
22B	Britwater gravelly silt loam, 2 to 5 percent slopes
23B	Lily-Ramsey complex, 2 to 5 percent slopes
24A	Parsons-Barden-Carytown silt loams, 0 to 3 percent slopes
26B2	Yelton loam, 2 to 5 percent slopes, eroded
27E	Beemont cobbly very fine sandy loam, 5 to 20 percent slopes, extremely stony
28C	Beemont loam, 3 to 9 percent slopes
29C	Portia fine sandy loam, 3 to 9 percent slopes
30C	Keeno very gravelly silt loam, 3 to 9 percent slopes
31C	Waben very gravelly silt loam, 3 to 9 percent slopes
35D	Hailey-Nixa very gravelly silt loams, 5 to 14 percent slopes
36D	Nixa-Clarksville very gravelly silt loams, 5 to 14 percent slopes
40D	Noark-Clarksville very gravelly silt loams, 5 to 14 percent slopes
41E	Noark very gravelly silt loam, 9 to 20 percent slopes
44G	Hailey-Rock outcrop-Moko complex, 35 to 60 percent slopes
45F	Clarksville very gravelly silt loam, 14 to 35 percent slopes
46G	Clarksville-Rock outcrop-Moko complex, 35 to 60 percent slopes
50C	Nixa very gravelly silt loam, 3 to 9 percent slopes
51B	Tonti-Scholten complex, 2 to 6 percent slopes
54	Dunning silt loam, overwashed
55	Elk-Huntington silt loams
61B	Hoberg silt loam, 2 to 5 percent slopes
76	Racoon silt loam
81B	Tonti silt loam, 1 to 3 percent slopes
82B	Rock outcrop-Lithic Udorthents complex, 2 to 5 percent slopes
83F	Moko-Rock outcrop complex, 5 to 50 percent slopes
83G	Rock outcrop-Moko complex, 50 to 95 percent slopes
84D	Bardley-Moko-Rock outcrop complex, 5 to 14 percent slopes
85D	Moko-Rock outcrop-Blueye complex, 5 to 14 percent slopes
85F	Moko-Blueye-Rock outcrop complex, 14 to 50 percent slopes
86D	Mano-Gatewood very gravelly silt loams, 5 to 14 percent slopes, extremely stony
86F	Mano-Ocie extremely gravelly silt loams, 14 to 50 percent slopes, extremely stony
87F	Moko-Snead-Rock outcrop complex, 14 to 50 percent slopes
88D	Blueye-Moko complex, 5 to 14 percent slopes
89D	Mano-Ocie very gravelly silt loams, 5 to 14 percent slopes
89F	Mano-Ocie very gravelly silt loams, 14 to 50 percent slopes
91B	Viraton silt loam, 2 to 5 percent slopes
92A	Secesh silt loam, 0 to 3 percent slopes
93B	Waben-Cedargap very gravelly silt loams, 0 to 5 percent slopes
94B	Hercules very gravelly silty clay loam, 1 to 5 percent slopes
96	Pits-Dumps complex

Index Map

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CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline
- AD HOC BOUNDARY (label) — Davis Airstrip
- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE
- STATE COORDINATE TICK — 1 890 000 FEET
- LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 55
- Federal — 287
- State — 52
- County, farm or ranch — 398

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small — water

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban area)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water
- Intermittent — int

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 11B 26B2

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Cherty areas (2-5 acres)

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 1

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

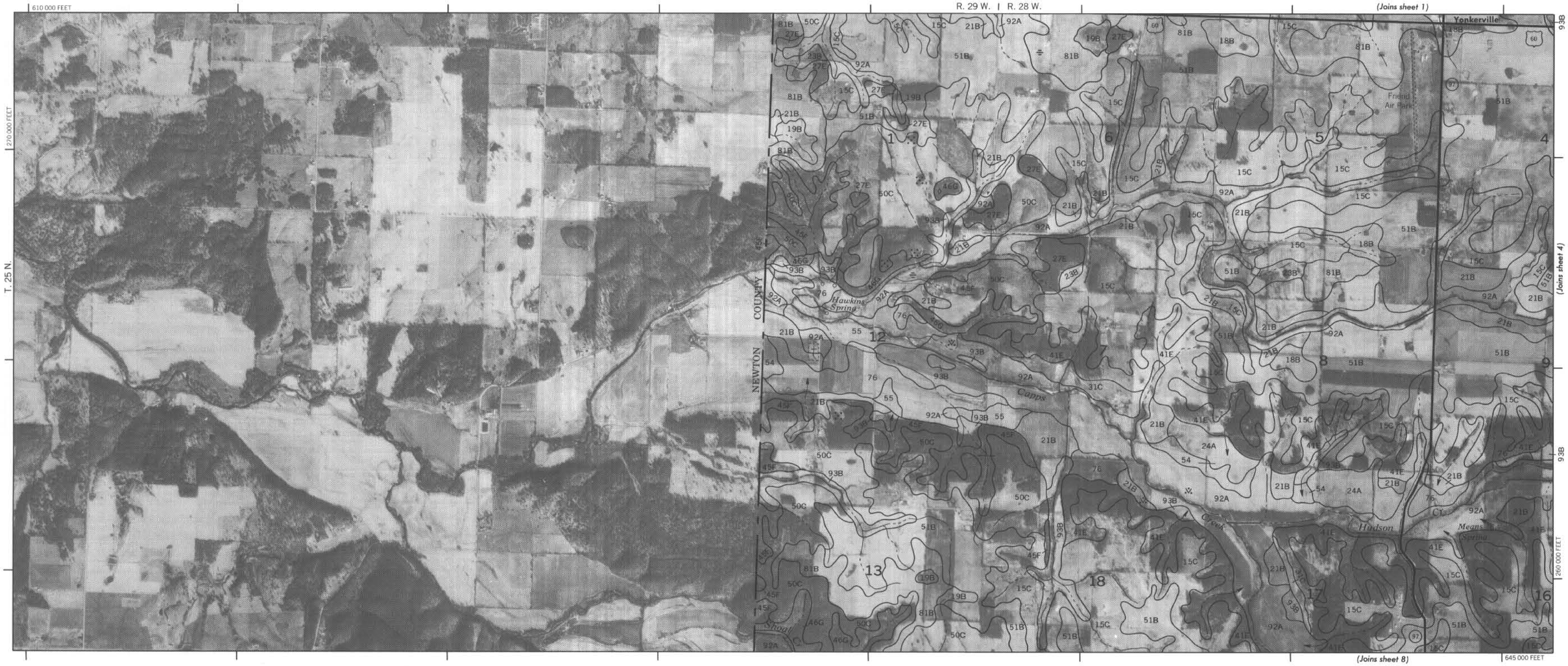
Index Map Welcome Page Manuscript

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 3



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

3

N

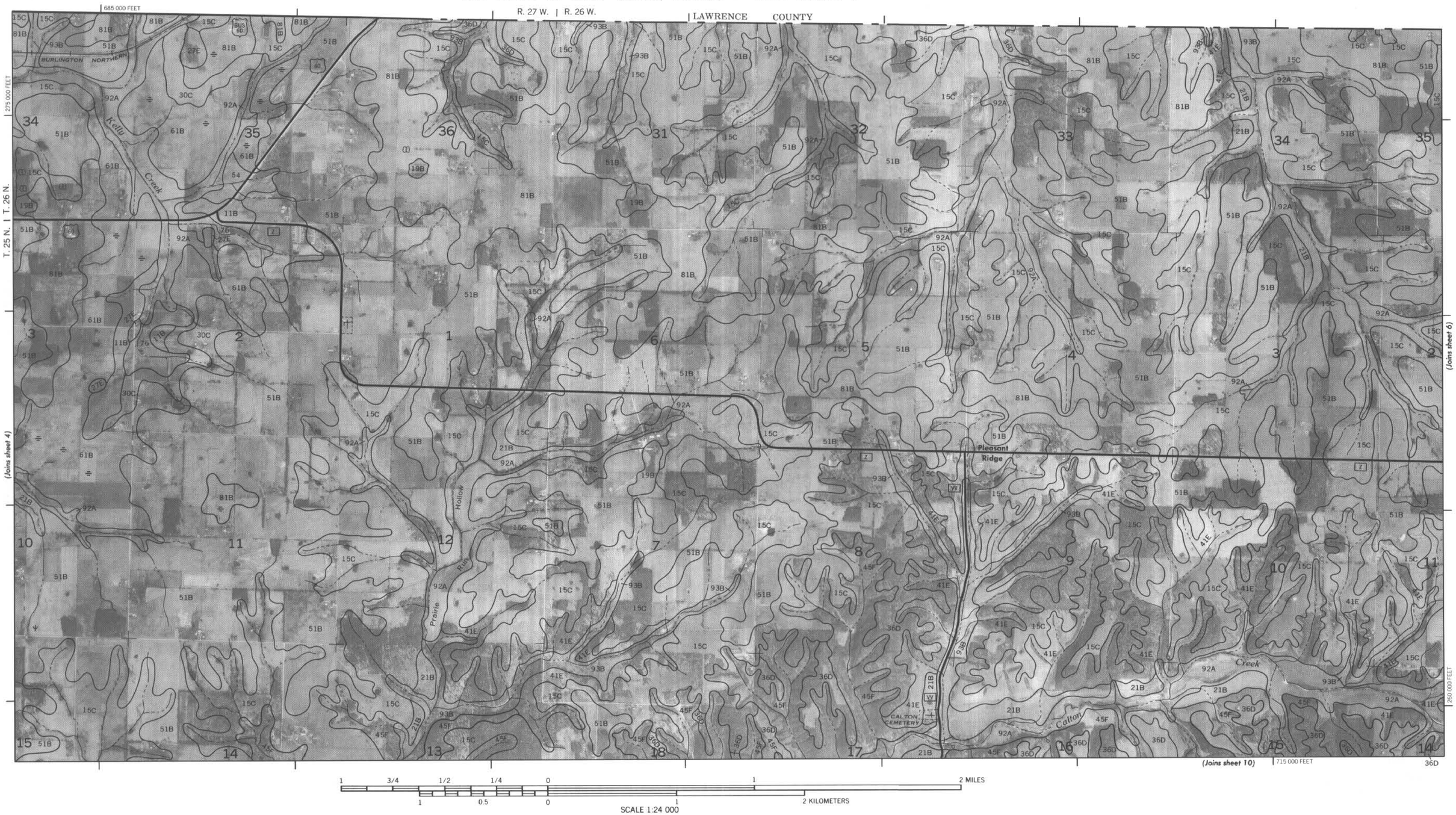
SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 4

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 5



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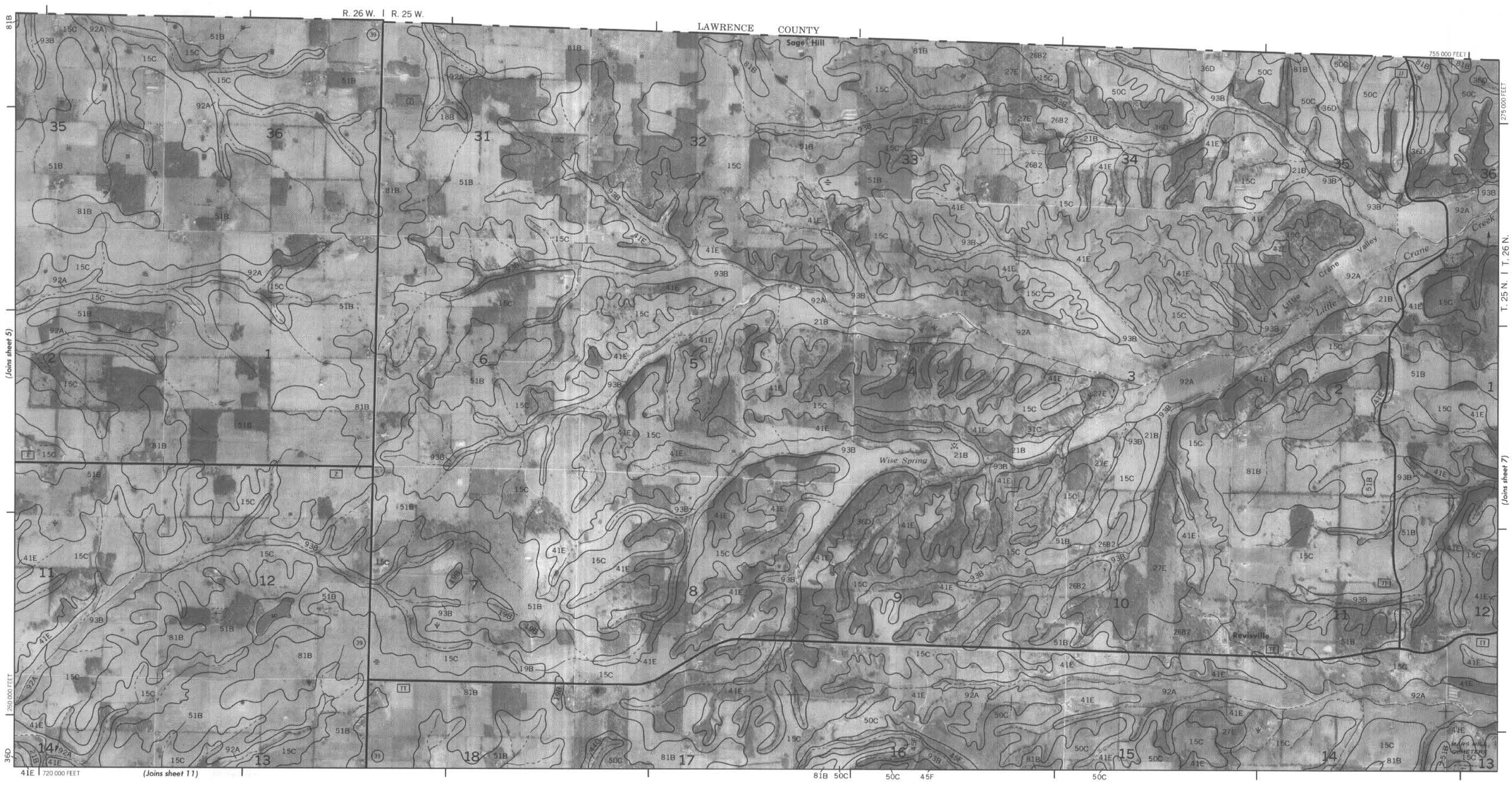
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


6
N
R. 26 W.
R. 25 W.
LAWRENCE COUNTY
Sage Hill
755 000 FEET
275 000 FEET
T. 25 N. | T. 26 N.
(Joins sheet 5)
(Joins sheet 7)
760 000 FEET
720 000 FEET
(Joins sheet 11)
Little Crane Valley Creek
Wise Spring
Revisville
Mars Hill Cemetery
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 7

7

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

8

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 9

9

N

R. 28 W. | R. 27 W.

650 000 FEET

(Joins sheet 4)

255 000 FEET

T. 25 N. 41E

(Joins sheet 8)

(Joins sheet 10)

245 000 FEET

Tailings

Hudson Creek

Northern Burlington

Goodnight Cemetery

Stinett Cemetery

Capps Creek

Little Flat Creek

21B (Joins sheet 14)

680 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

10

N

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 10

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 11

11

N

R. 26 W. | R. 25 W.

720 000 FEET

755 000 FEET

T. 25 N.

(Joins sheet 6)

(Joins sheet 10)

(Joins sheet 12)

(Joins sheet 16)

Madry

Scholten

Wheelerville

Oxbow Spring

Roaring Spring

Stansberry Creek

Bean Factory Spring

Pigeon Roost Cave

Brantley Hollow

Gardener Hollow

Baldwin Hollow

Hobson Br

Lead Mine Br

West Fork

East Fork

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


12
N
15C 41E
(Joins sheet 7)
R. 25 W.
790 000 FEET
255 000 FEET
T. 25 N.
245 000 FEET
760 000 FEET
(Joins sheet 17)
(Joins sheet 11)
STONE COUNTY
13
24
25
36
41E
15C
51B
21B
92A
26B2
93B
44G
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

610 000 FEET

T. 24 N. | T. 25 N.

240 000 FEET

R. 29 W. | R. 28 W.

(Joins sheet 8)

(Joins sheet 14)

(Joins sheet 18)

645 000 FEET

230 000 FEET

R. 29 W. | R. 28 W.

NEWTON COUNTY

Pioneer

Shoal Creek

Zerbert Br.

Joplin Creek

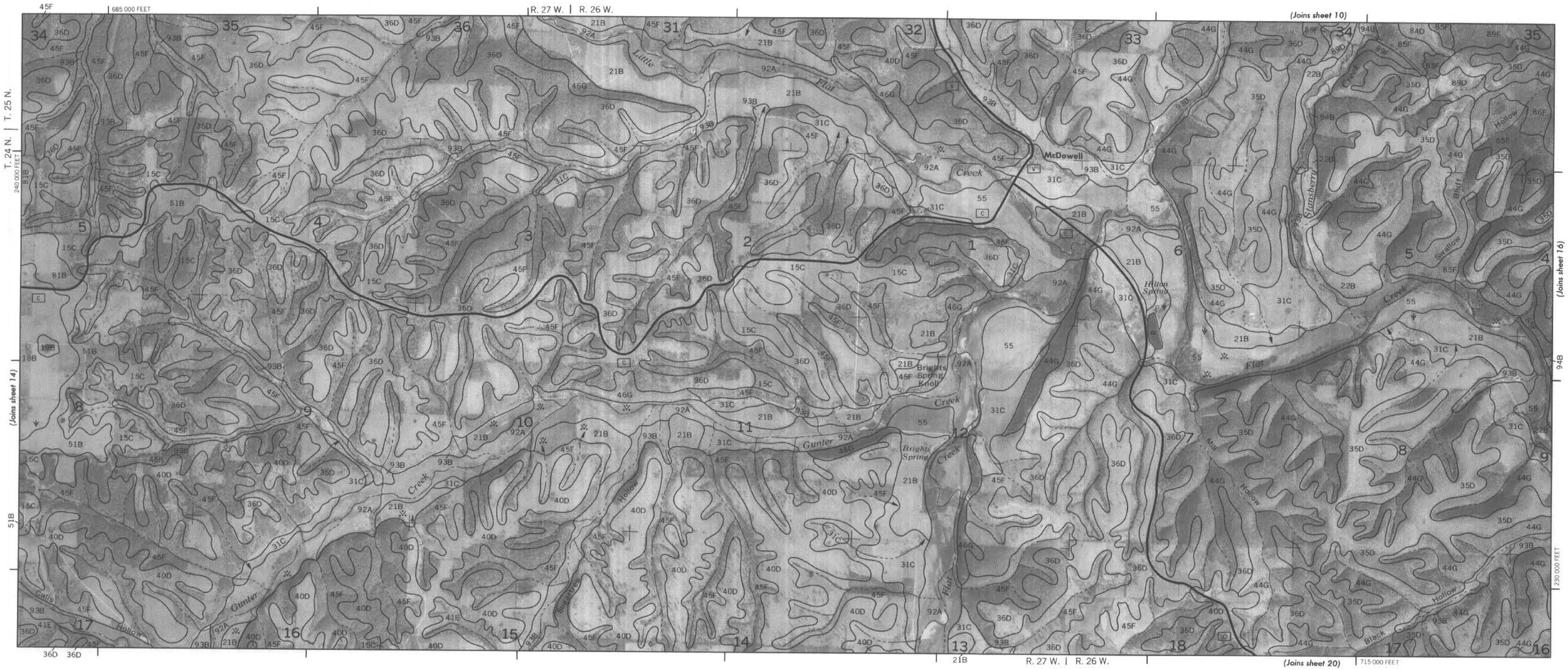
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


14
N
R. 28 W. | R. 27 W.
680 000 FEET
240 000 FEET
T. 24 N. | T. 25 N.
230 000 FEET
650 000 FEET
(Joins sheet 9)
(Joins sheet 13)
(Joins sheet 19)
(Joins sheet 15)
MATTY CEMETERY
Purdy
East Purdy
Corsicana
Joyce Creek
Fly Spring
Little Flat Creek
Hollow
Cain
BURLINGTON NORTHERN
1 MILE
1 KILOMETER
SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 15



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

16

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 17

17

N

760 000 FEET

R. 25 W.

(Joins sheet 12)

T. 24 N. | T. 25 N.

240 000 FEET

STONE COUNTY

(Joins sheet 16)

(Joins sheet 22)

790 000 FEET

230 000 FEET

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

18

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SCALE 1:24 000

(20)

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 20

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 21

21

N

720 000 FEET

R. 26 W. | R. 25 W.

(Joins sheet 16)

225 000 FEET

T. 24 N.

(Joins sheet 20)

(Joins sheet 22)

215 000 FEET

(Joins sheet 26)

755 000 FEET

Coon Creek

Jenkins Creek

Cave Spring Hollow

Prairie Hollow

Willow Branch

Flat Branch

Jacks Branch

Hollow

Worley Spring

Blacksmith Br

Flat Creek

Bailey Branch

Ballist Hollow

CLIO CEMETERY

KANE CEMETERY

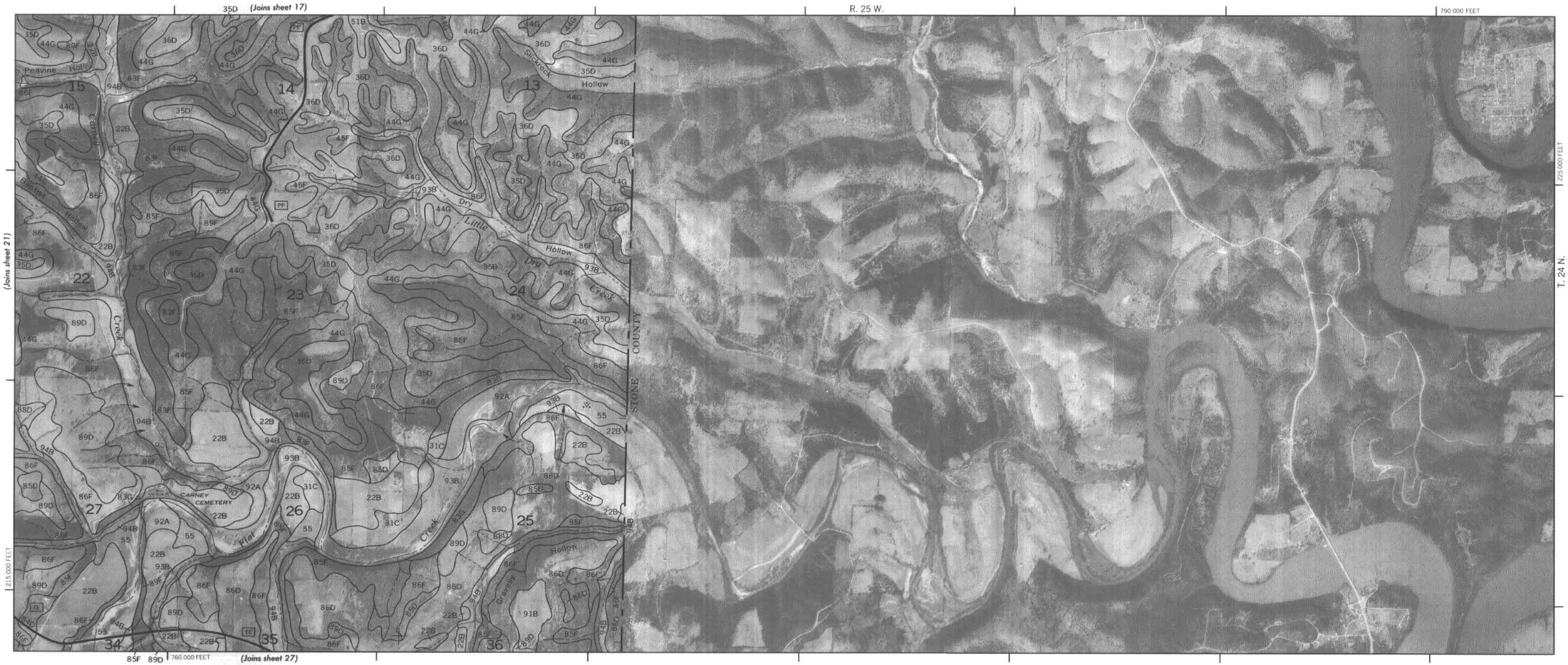
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

22

N

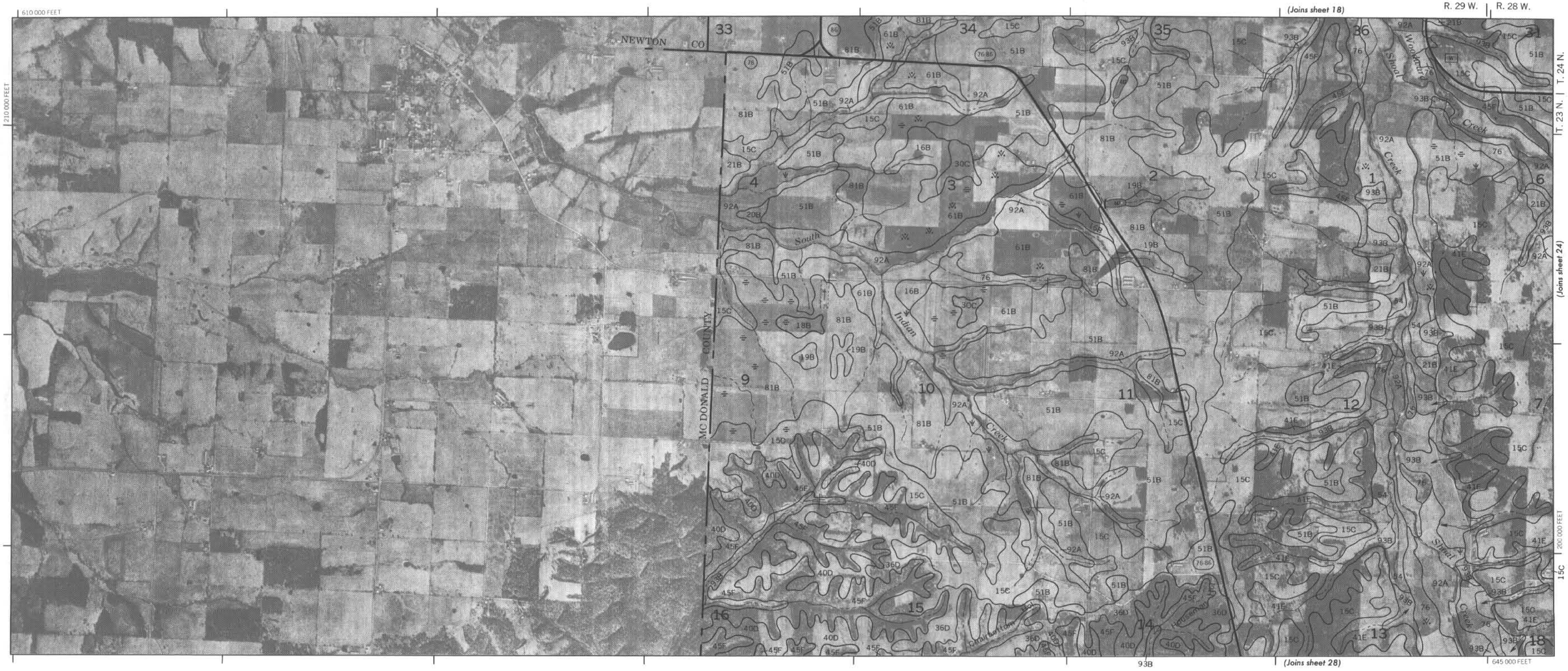


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 23



1 3/4 1/2 1/4 0 1 2 MILES

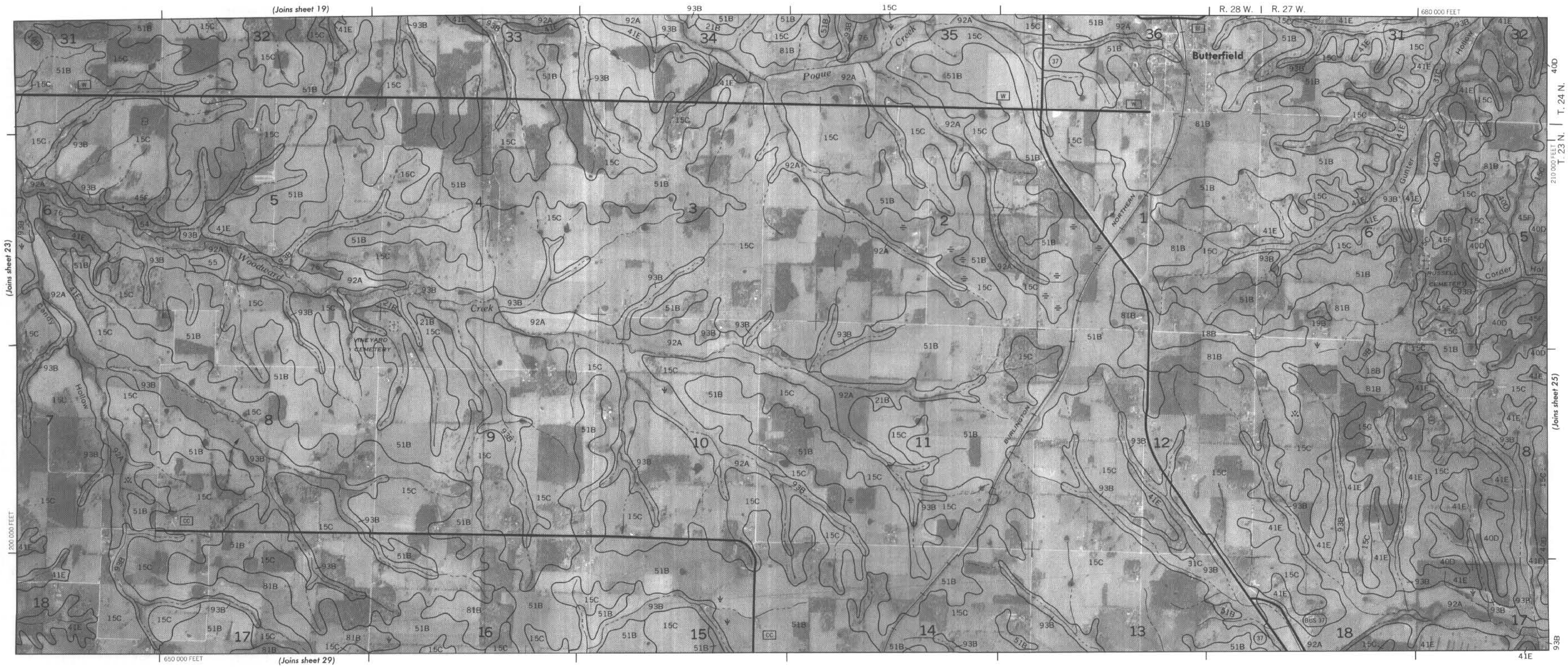
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

23

N

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 24



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

685 000 FEET

R. 27 W. | R. 26 W.

T. 24 N.

T. 23 N.

210 000 FEET

(Joins sheet 20)

(Joins sheet 24)

(Joins sheet 26)

(Joins sheet 30)

715 000 FEET

200 000 FEET

Twin Springs

Hollow

Carder

Ash Cove

Spout Springs

Cross

Hollow

Fortune

Branch

Oak Ridge

Sink Hole Ridge

Hollow

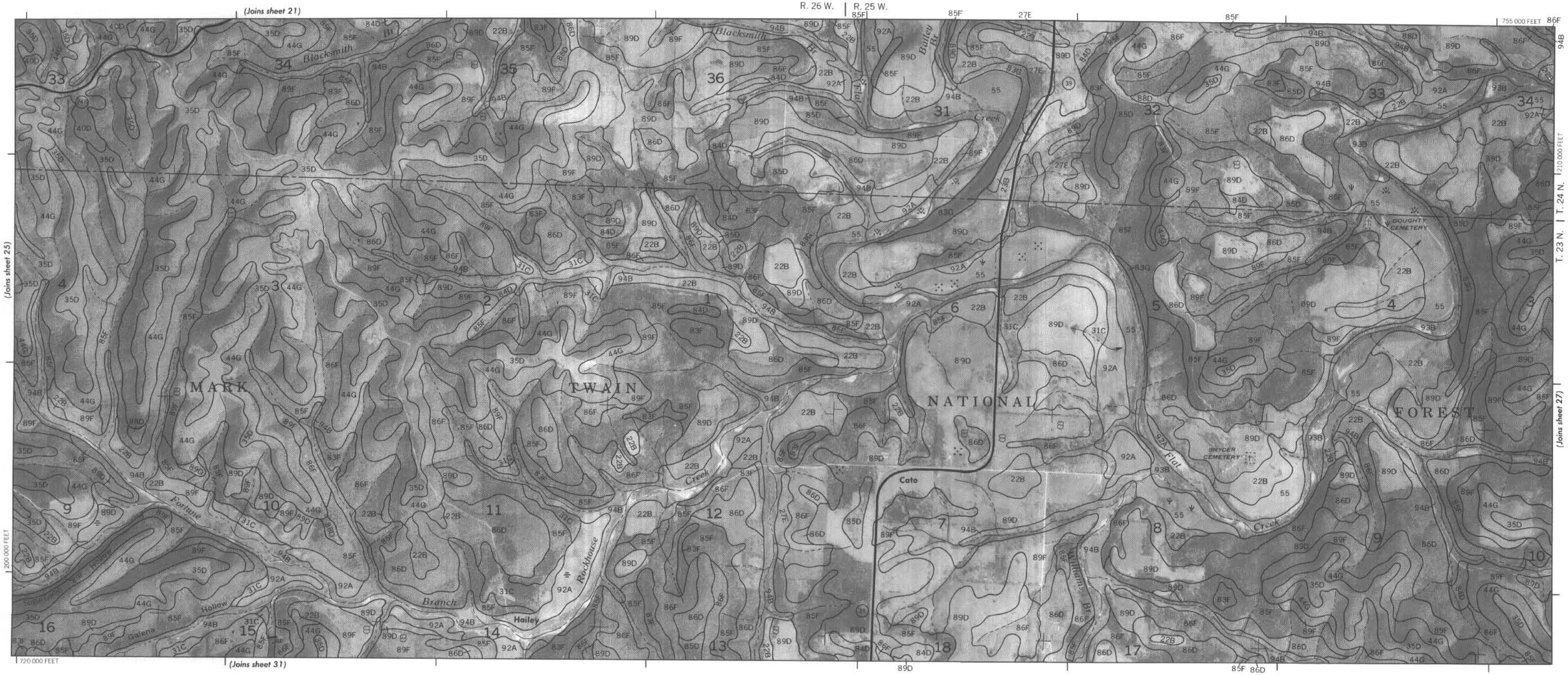
Sweet Gum Camp

MARK TWAIN NATIONAL FOREST

1 3/4 1/2 1/4 0 1 2 MILES

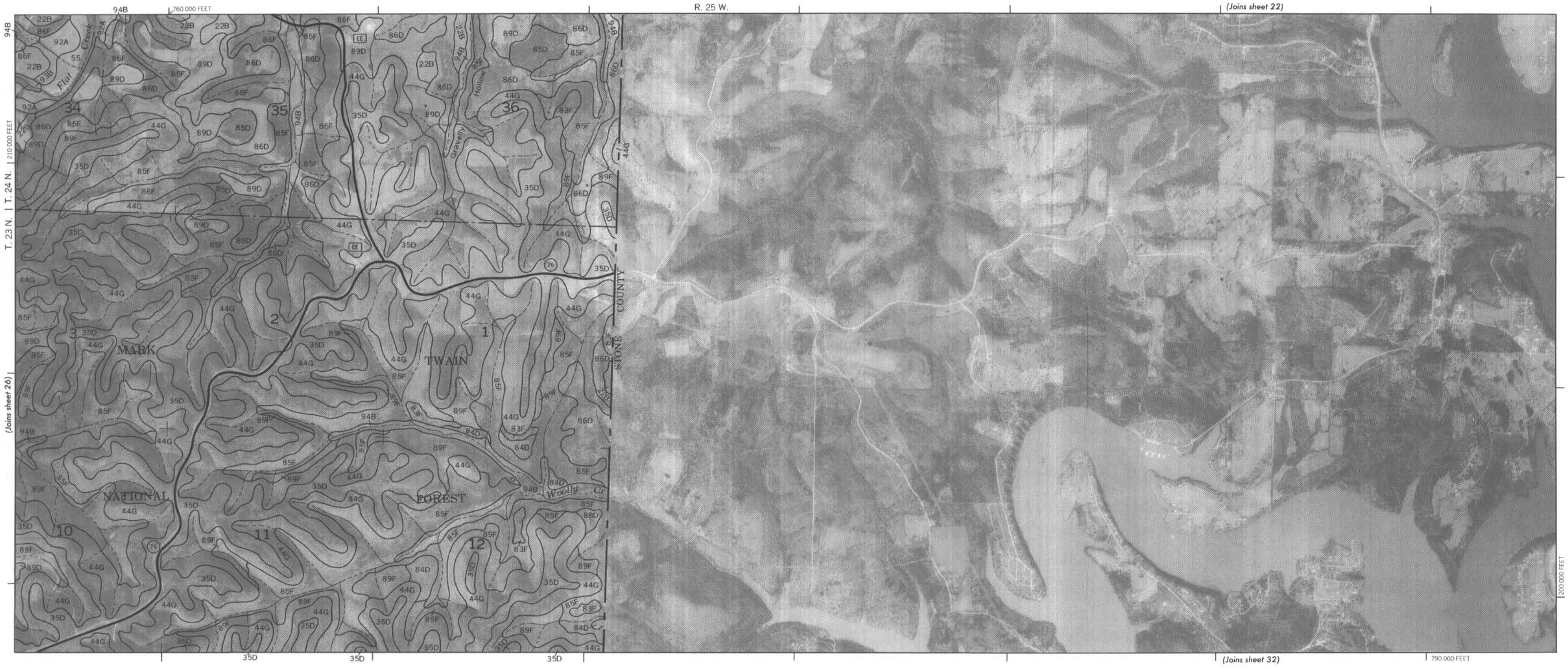
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


(26)
N
(Joins sheet 21)
R. 26 W.
R. 25 W.
755 000 FEET
T. 23 N. | T. 24 N.
210 000 FEET
(Joins sheet 25)
(Joins sheet 27)
200 000 FEET
720 000 FEET
(Joins sheet 31)
MARK TWAIN NATIONAL FOREST
Blacksmith
Bailey Br
Fortune Hollow
Rockhouse Branch
Williams Br
Cato
Hailey
Galena
DOUGHTY CEMETERY
SNYDER CEMETERY
Flat Creek
Creek
SCALE 1:24 000
2 MILES
2 KILOMETERS

27

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

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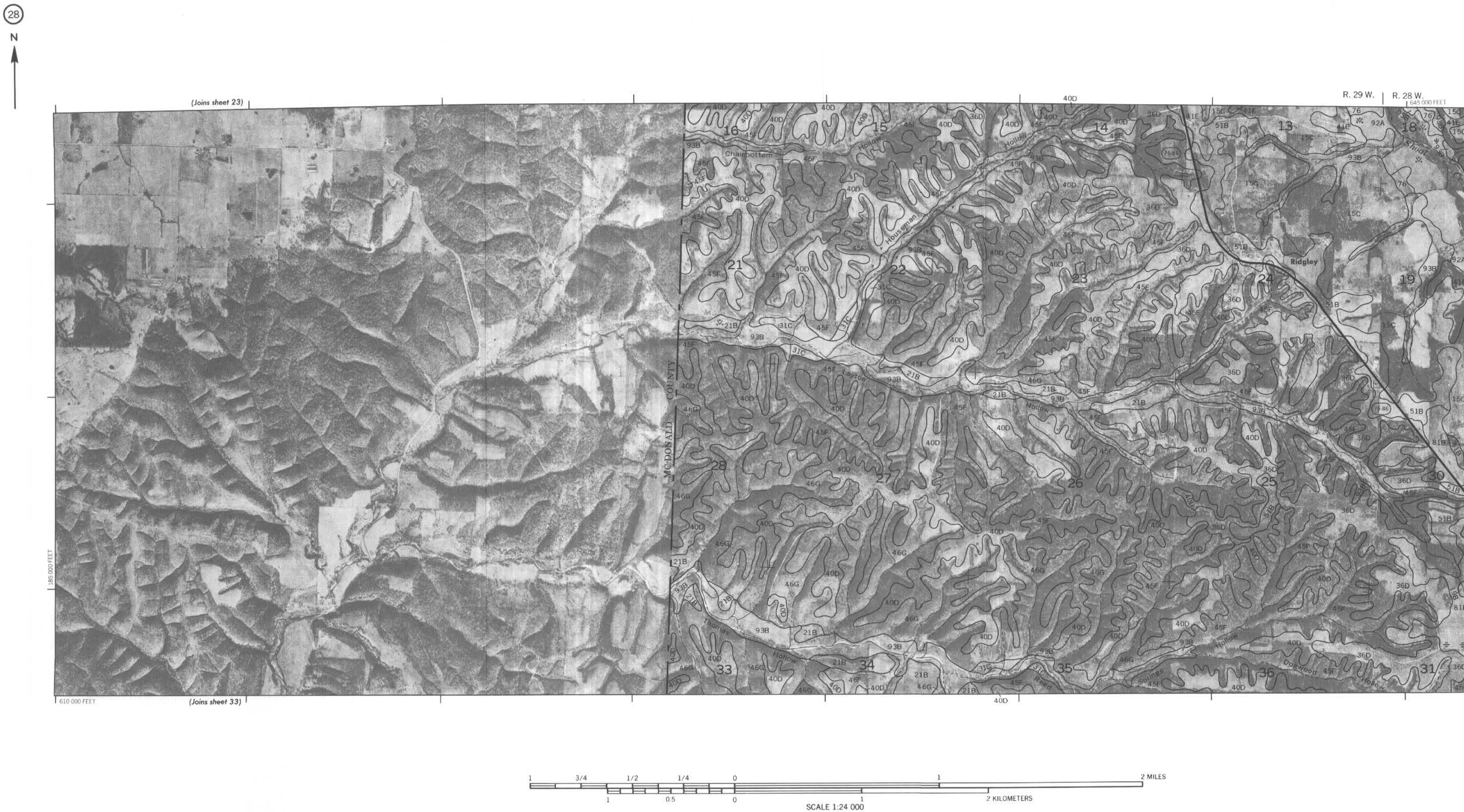


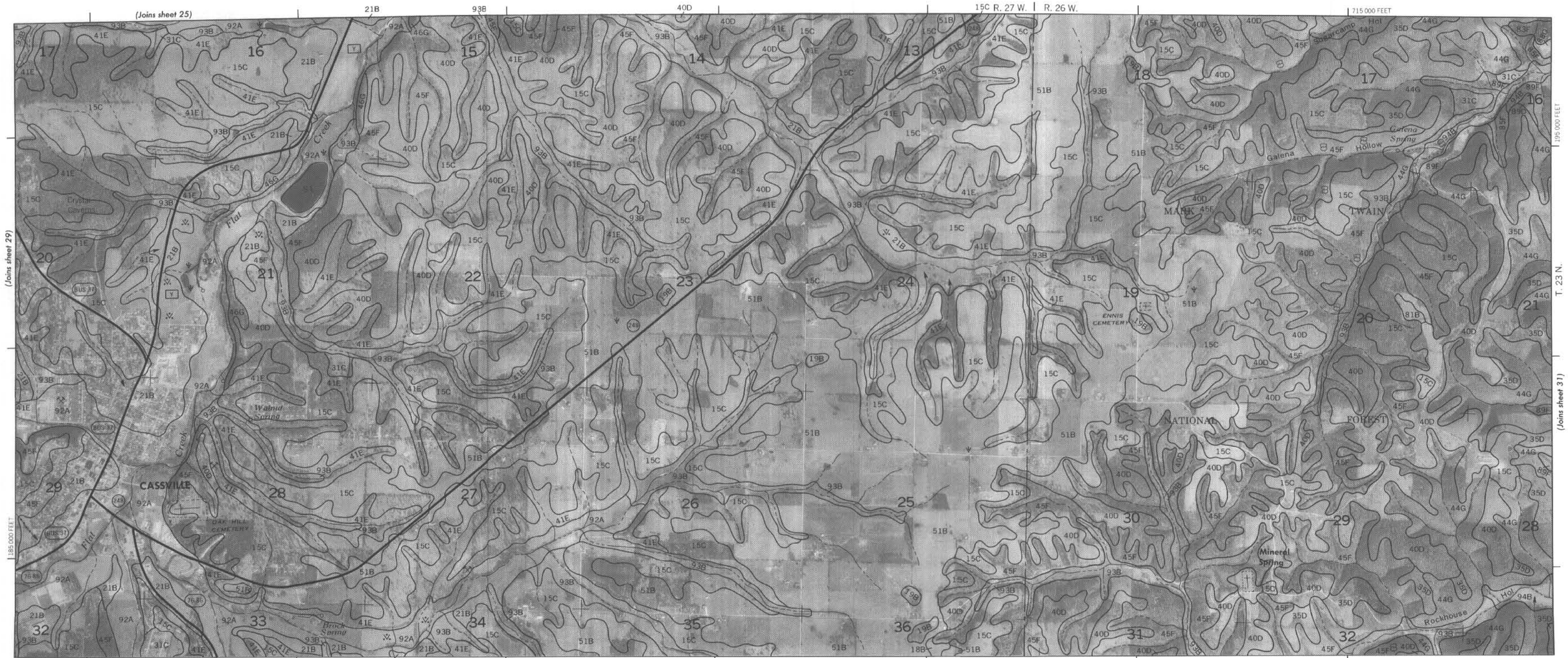
29

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

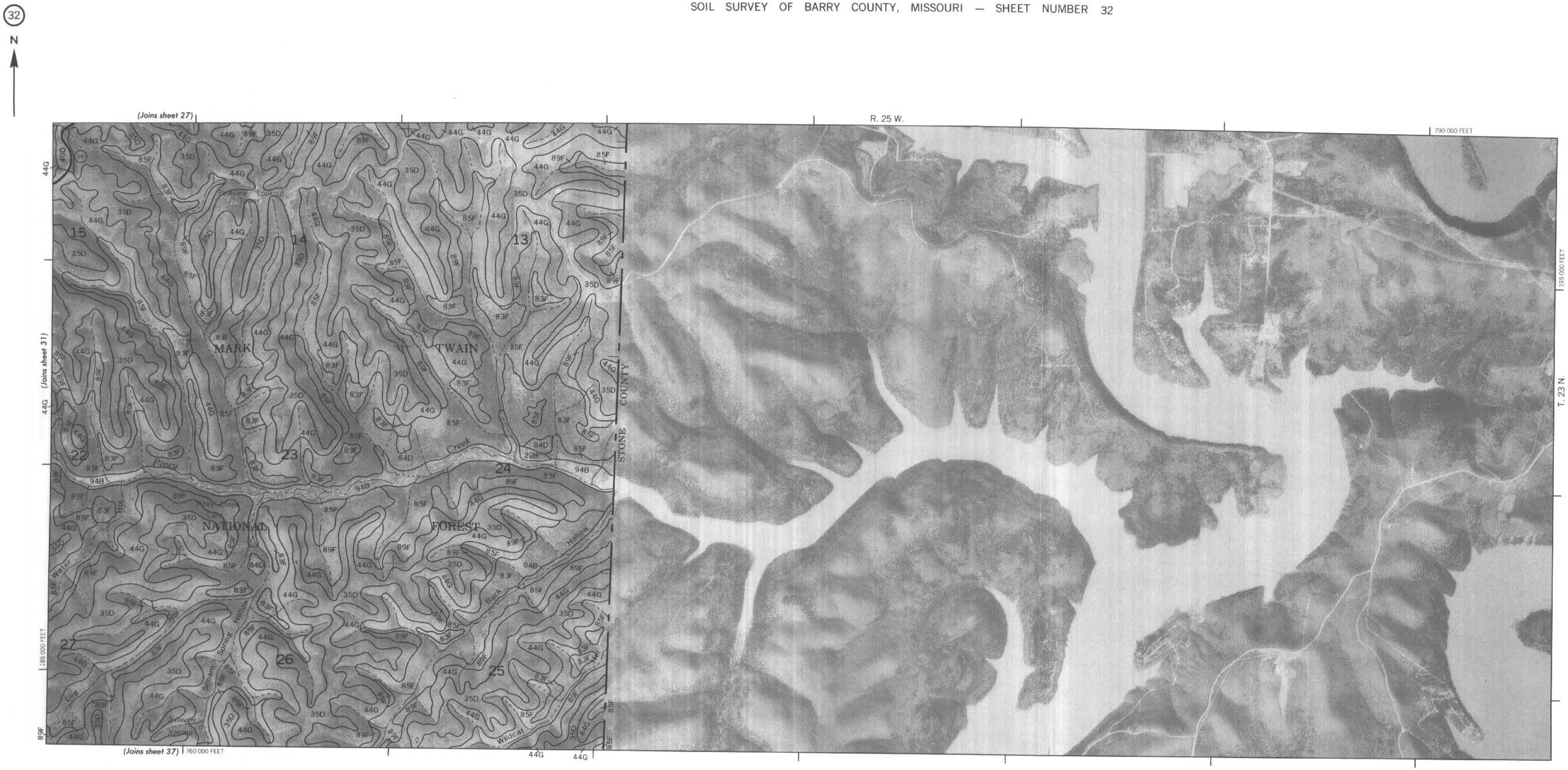
SCALE 1:24 000


30
N
(Joins sheet 25)
R. 27 W.
R. 26 W.
715 000 FEET
195 000 FEET
T. 23 N.
(Joins sheet 29)
(Joins sheet 31)
185 000 FEET
685 000 FEET
(Joins sheet 35)
CASSVILLE
OAK HILL CEMETERY
ENNIS CEMETERY
NATIONAL FOREST
MARK TWAIN
Crystal Cave
Flat Creek
Walnut Spring
Brock Spring
Galena Spring
Hollow
Mineral Spring
Rockhouse
Hot
Sugarcamp
Creek
Fld
BUS 37
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 31

32

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 32



SCALE 1:24 000

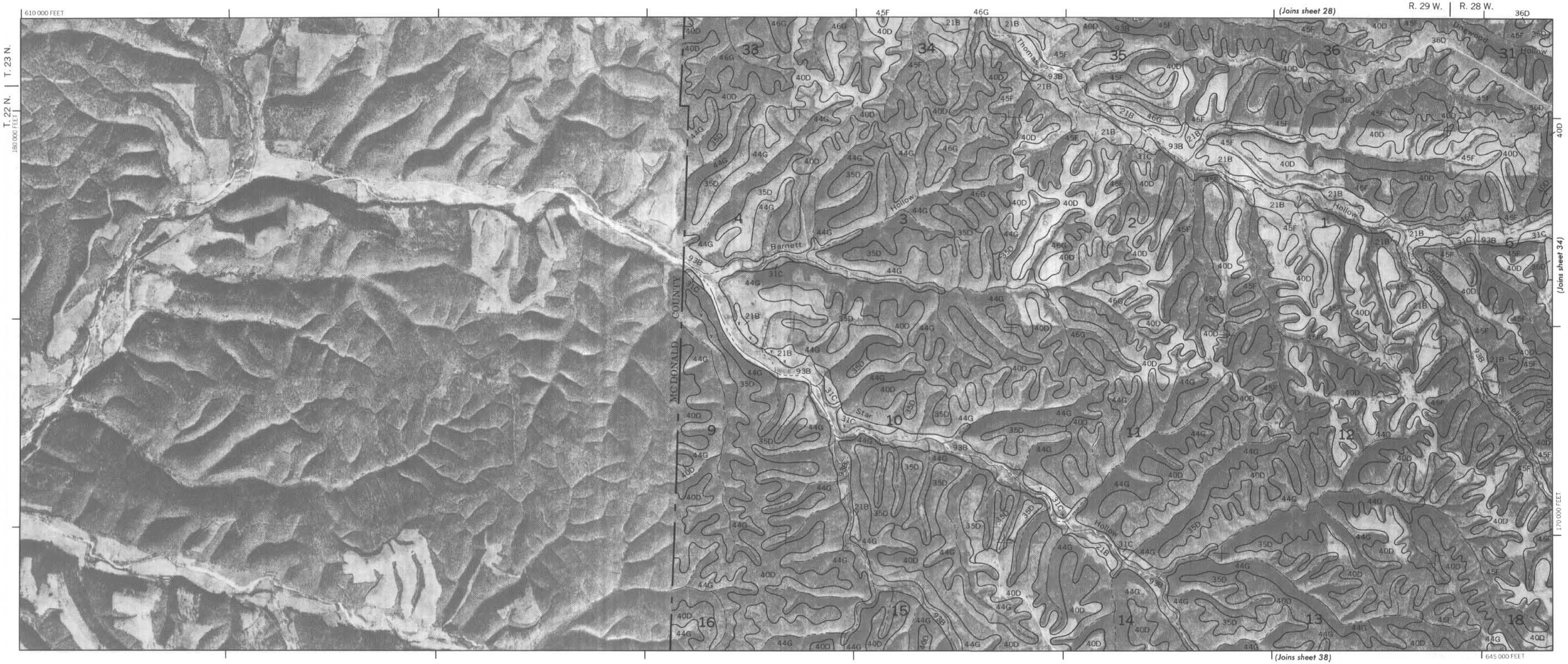
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 33

33

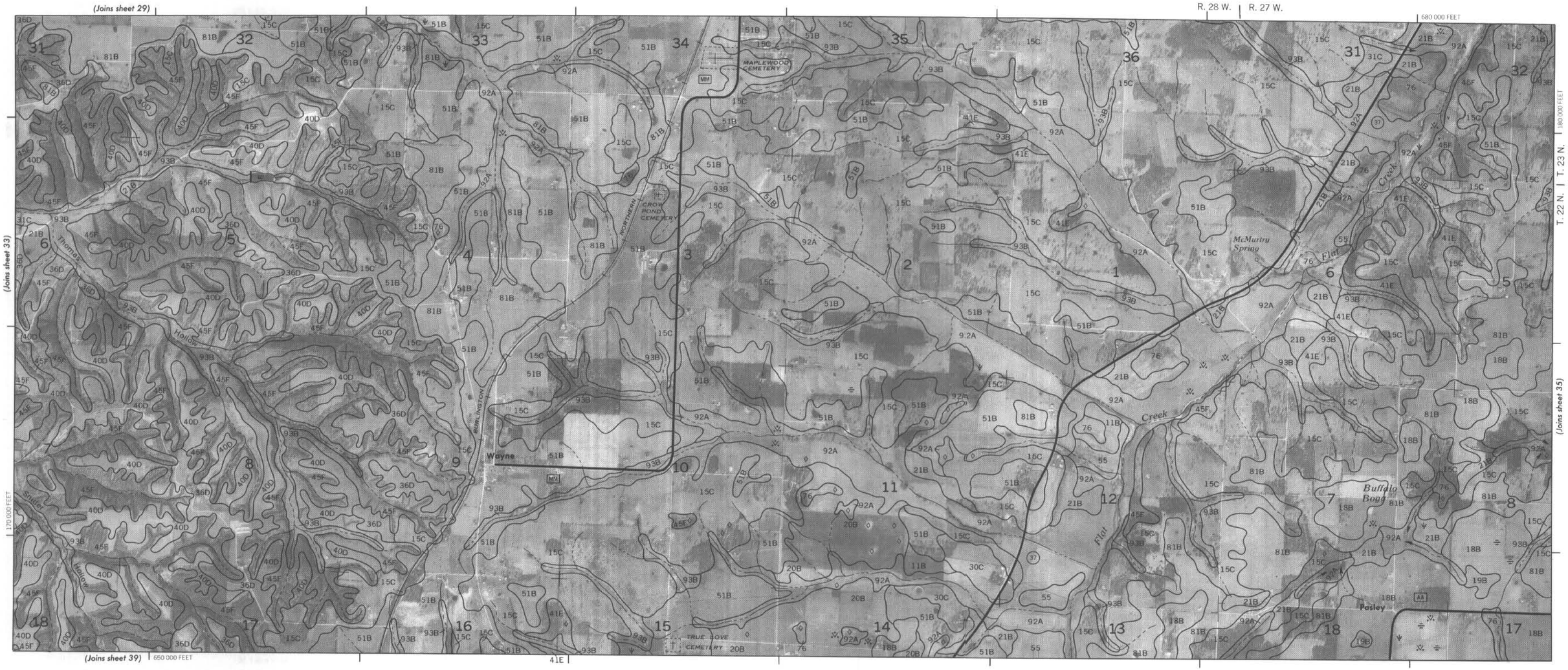
N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


(34)
N
(Joins sheet 29)
R. 28 W.
R. 27 W.
680 000 FEET
T. 22 N. | T. 23 N.
180 000 FEET
(Joins sheet 33)
(Joins sheet 35)
170 000 FEET
(Joins sheet 39)
650 000 FEET
41E
MAPLEWOOD CEMETERY
NORTHERN CROW POND CEMETERY
TRUE LOVE CEMETERY
Wayne
Pasley
McMurtry Spring
Thomas Hollow
Hollow
Shiller
Burlington
Flat Creek
Buffalo Bend
Flat Creek
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 35

35

N

685 000 FEET

R. 27 W. | R. 26 W.

(Joins sheet 30)

T. 22 N. | T. 23 N.

180 000 FEET

(Joins sheet 34)

(Joins sheet 36)

170 000 FEET

720 000 FEET

(Joins sheet 40)

Hilltop

Bates Corner

Landing Field

HORNER CEMETERY

Rockhouse Hollow

MARK TWAIN NATIONAL FOREST

Roaring River

Rock Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

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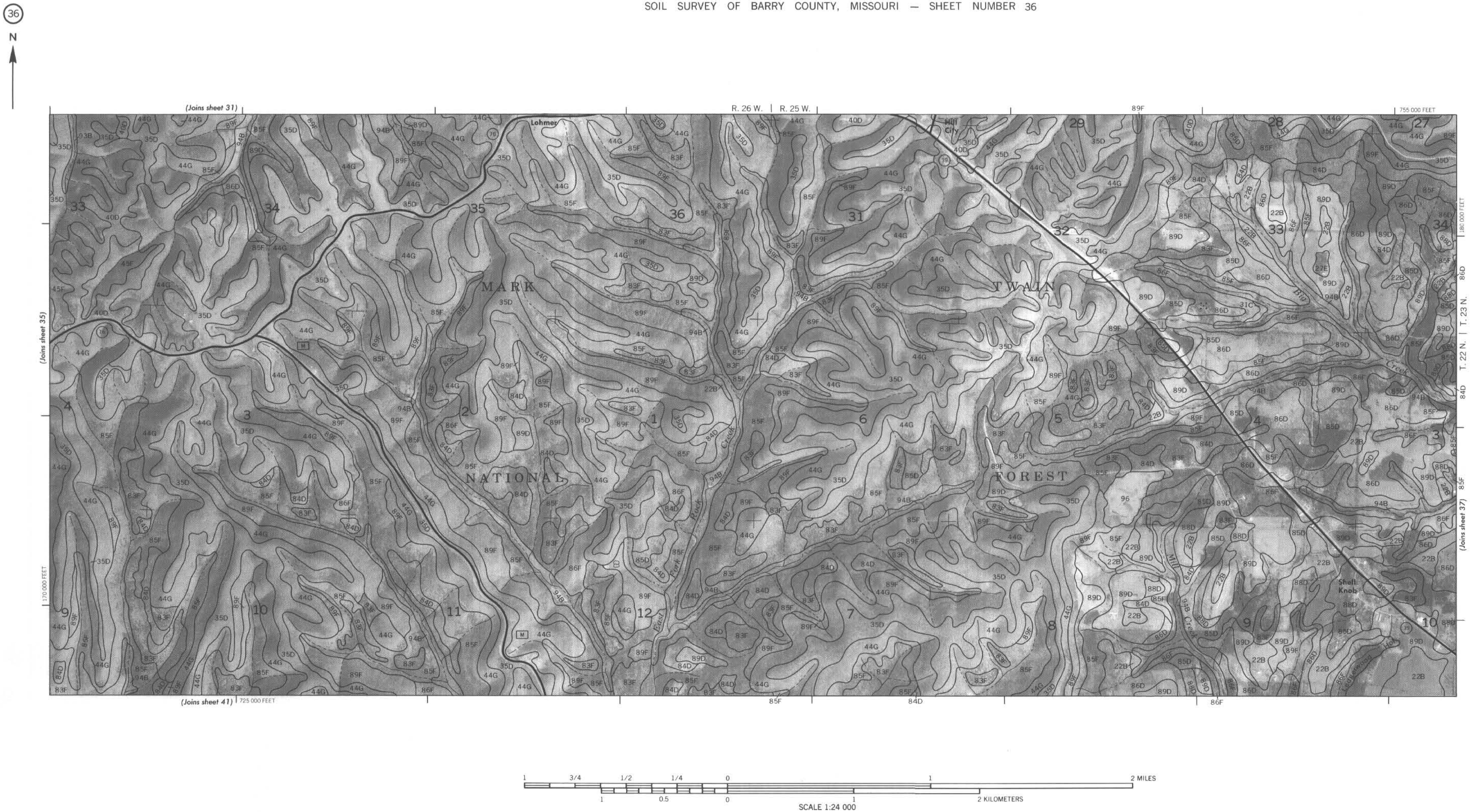
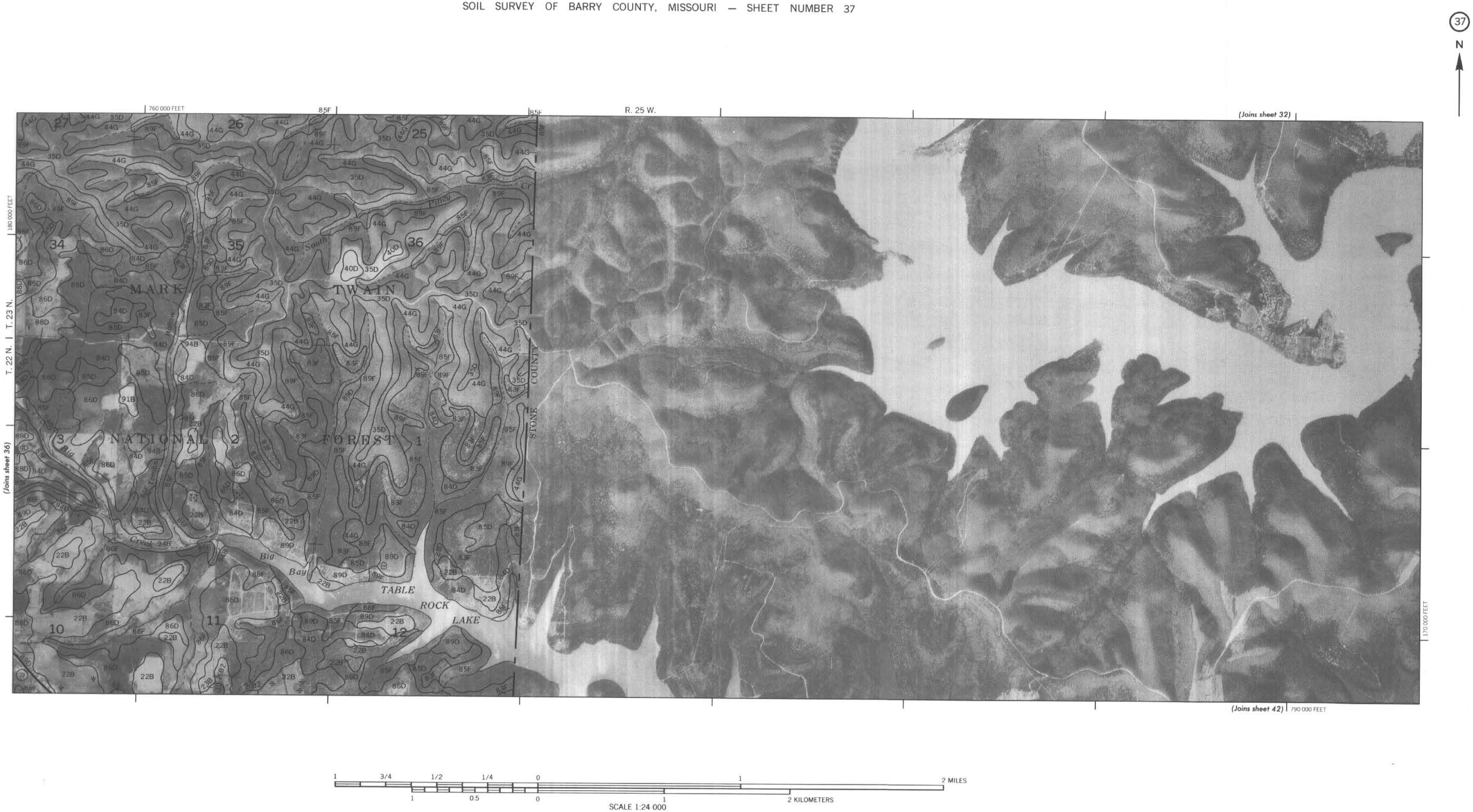



37
N
760 000 FEET
R. 25 W.
(Joins sheet 32)
180 000 FEET
T. 23 N.
T. 22 N.
(Joins sheet 36)
MARK TWAIN
NATIONAL FOREST
STONE COUNTY
TABLE ROCK LAKE
Big Bay
(Joins sheet 42)
790 000 FEET
170 000 FEET
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

38

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 39

39

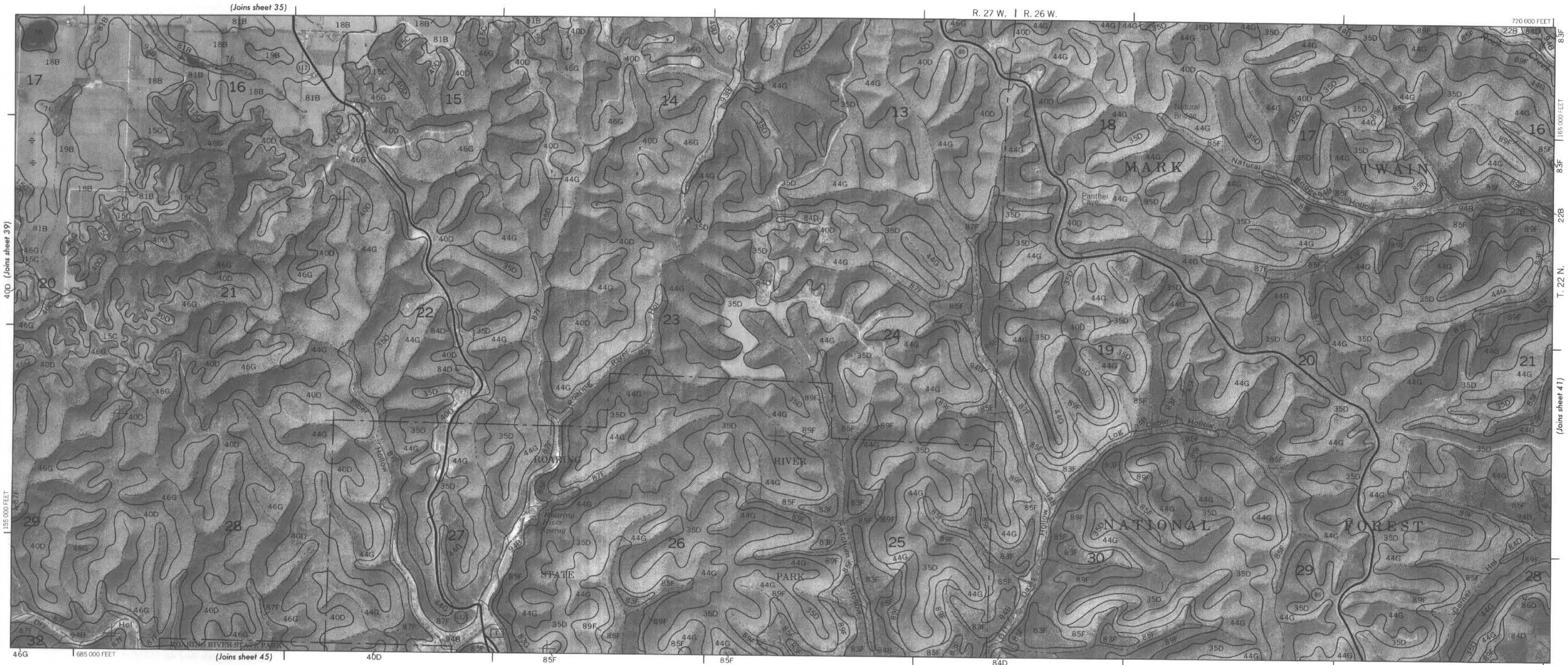
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

Index Map Welcome Page Manuscript



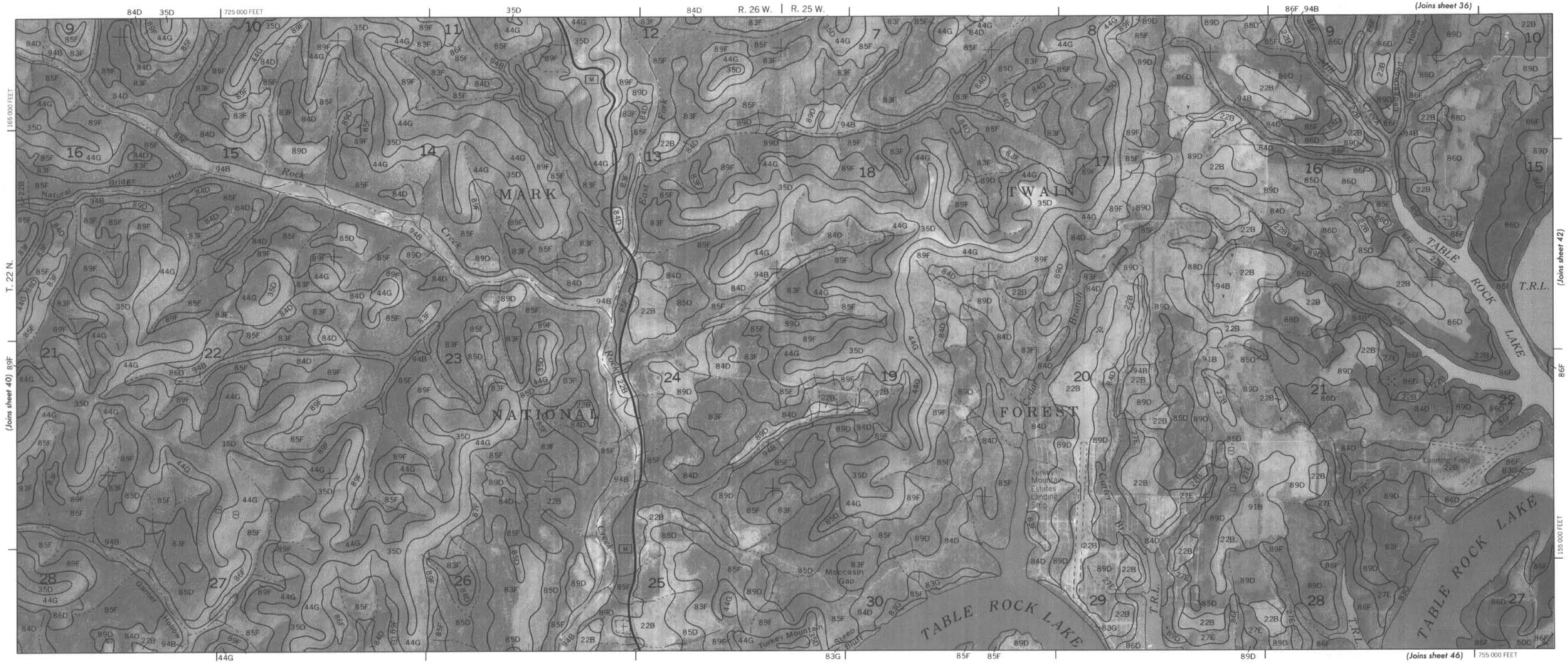
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

41

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

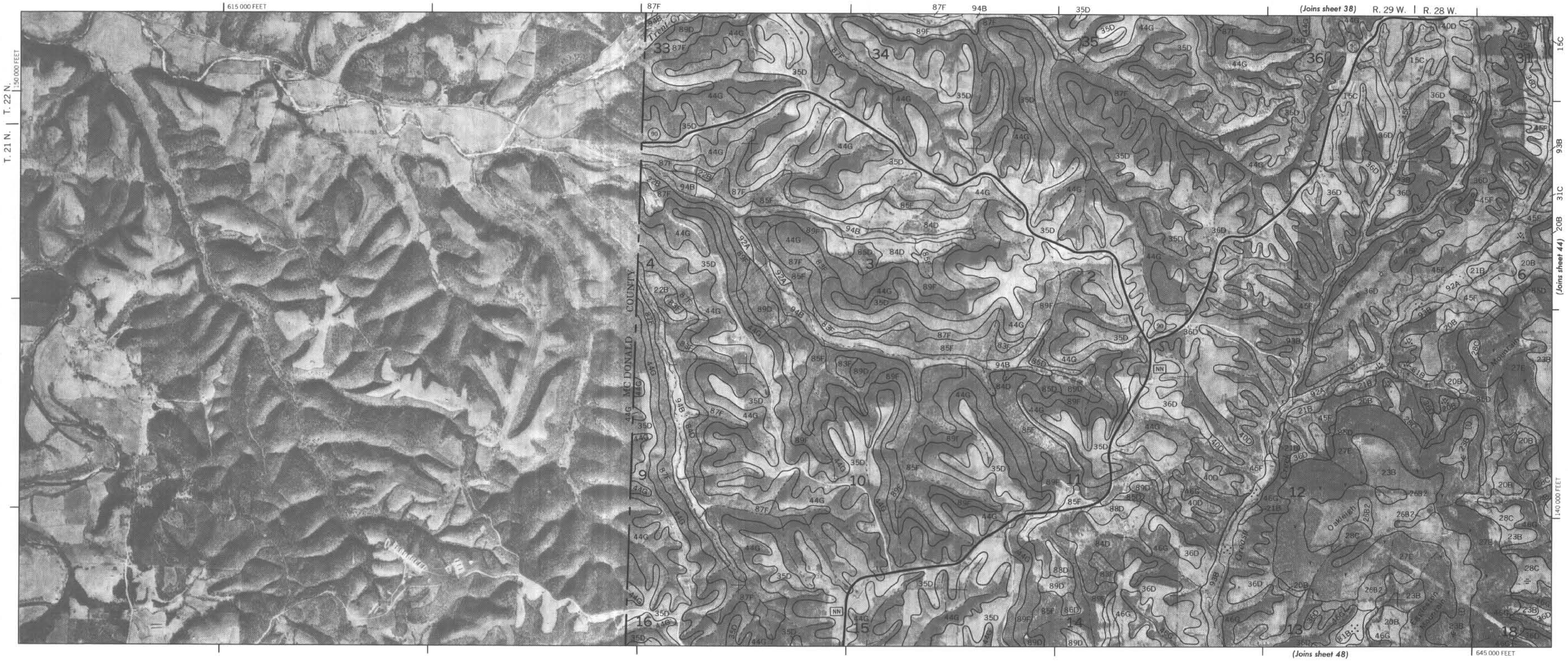
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

Index Map Welcome Page Manuscript

43

N

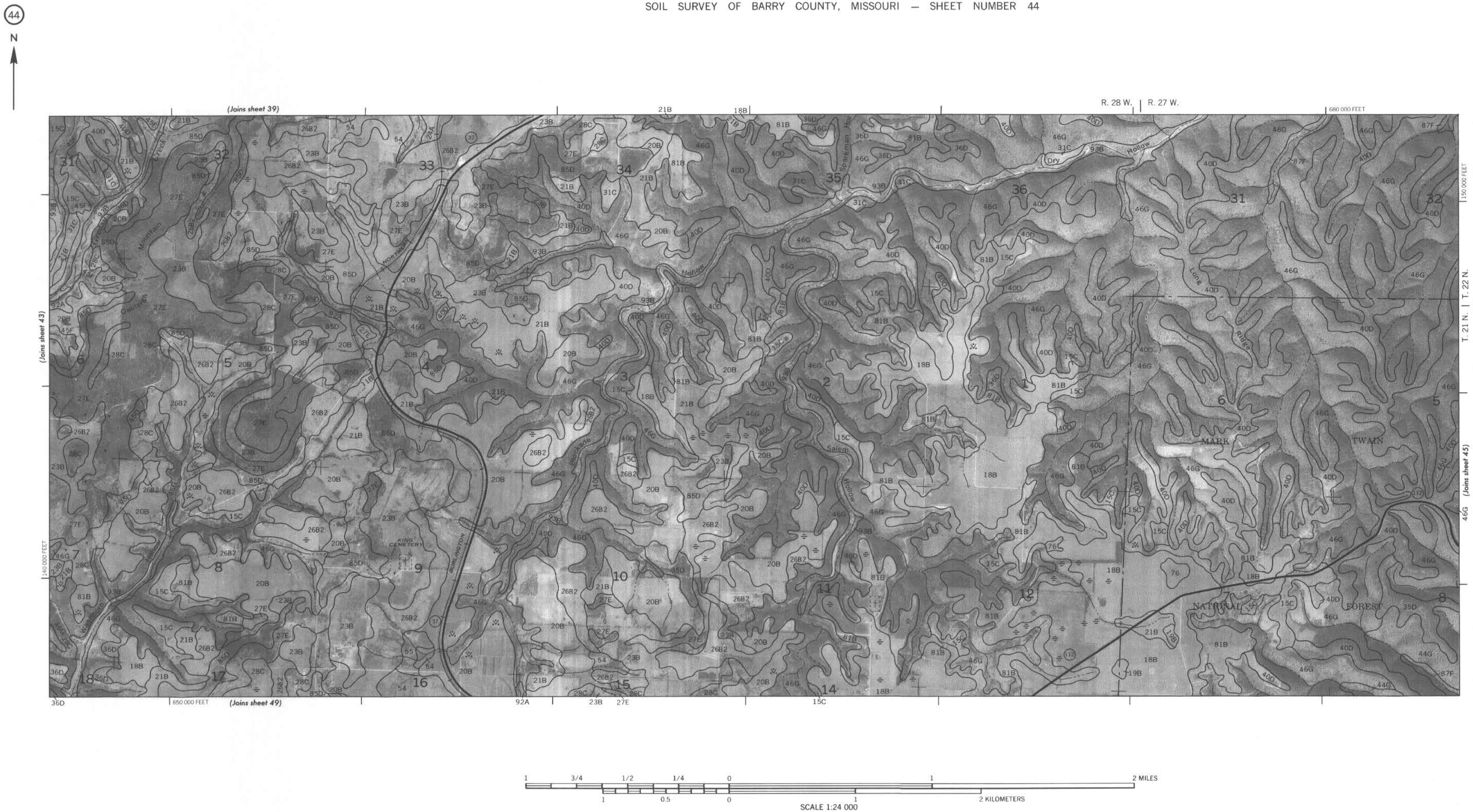


1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

Index Map Welcome Page Manuscript



SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 45

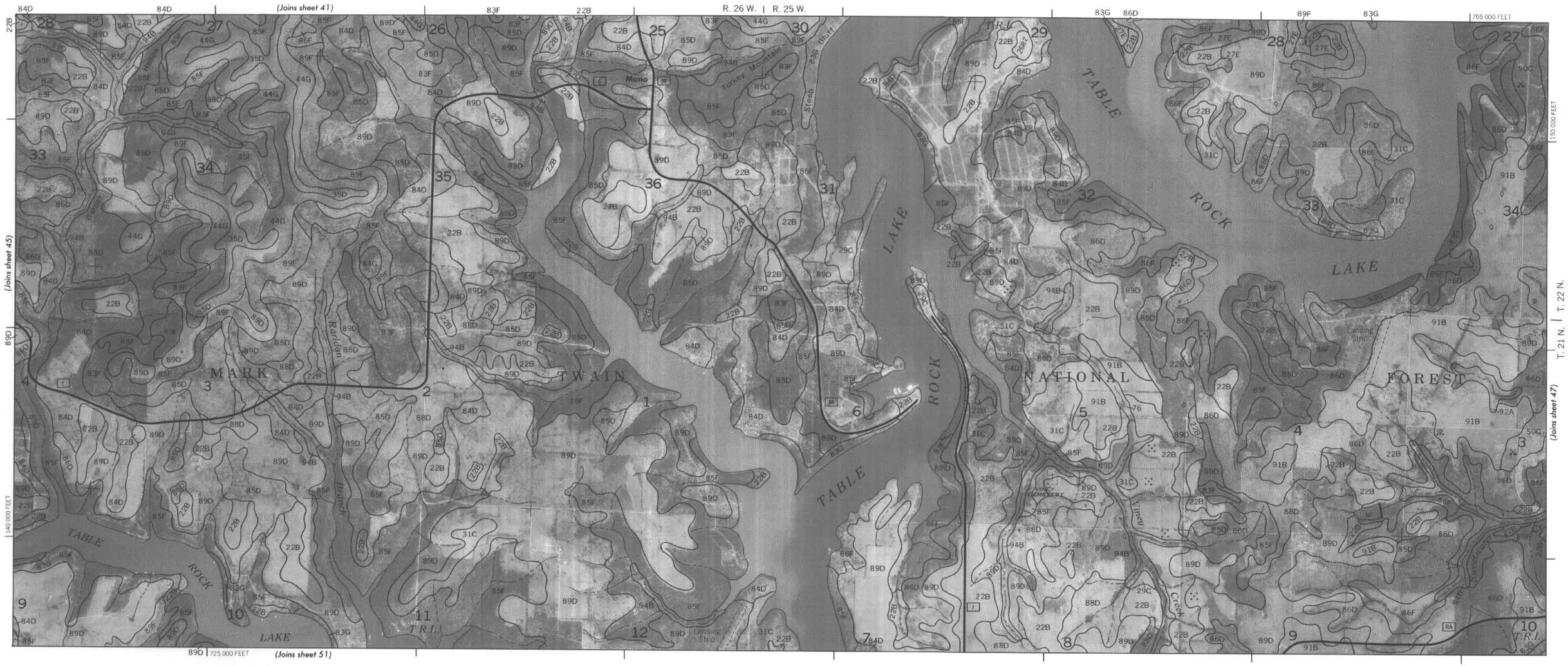
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

45

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

47

N

760 000 FEET

R. 25 W.

(Joins sheet 42)

T. 22 N.

T. 21 N.

(Joins sheet 46)

150 000 FEET

140 000 FEET

(Joins sheet 52)

790 000 FEET

TABLE ROCK LAKE

MARK TWAIN NATIONAL FOREST

STONE COUNTY

Viola

VIOLA CEMETERY

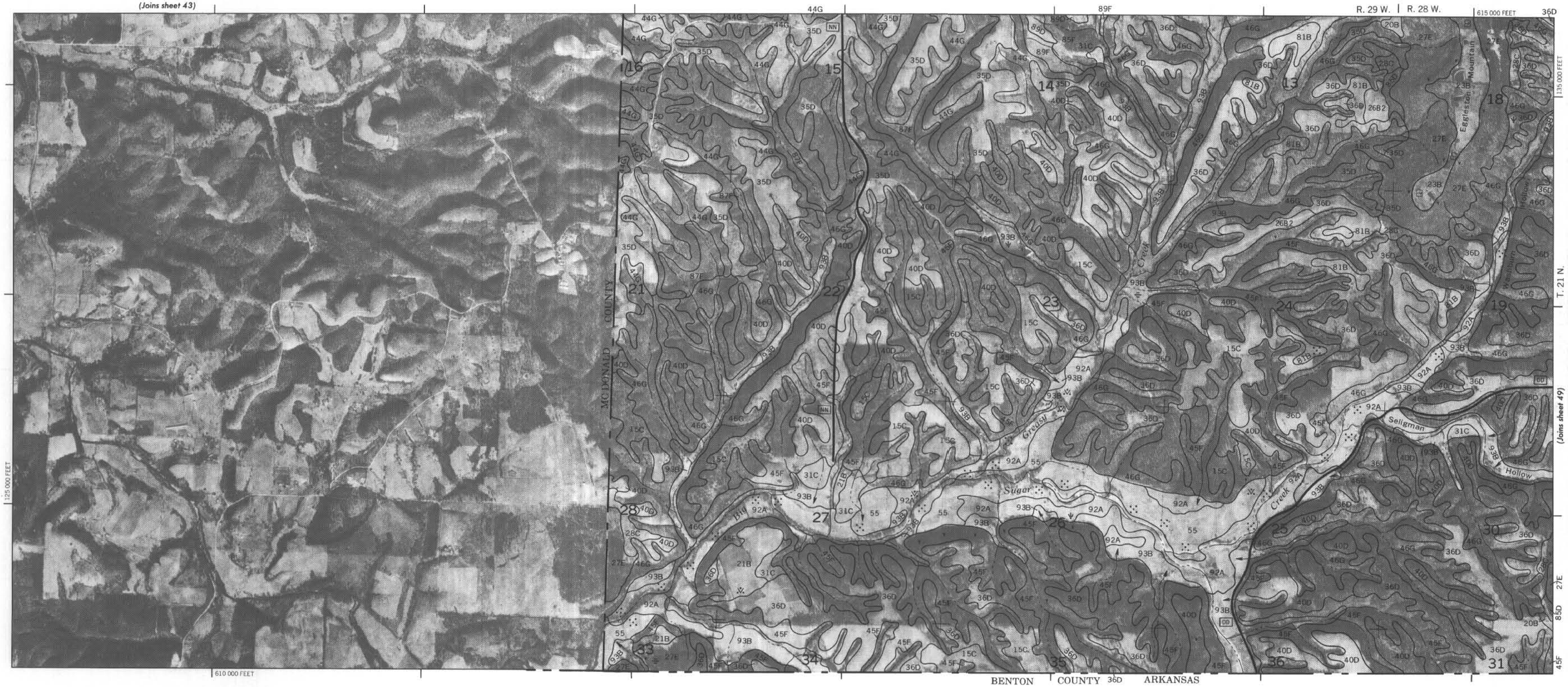
T.R.L.

Roads Reforms Hwy

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


(48)
N
(Joins sheet 43)
R. 29 W.
R. 28 W.
615 000 FEET
610 000 FEET
125 000 FEET
135 000 FEET
T. 21 N.
(Joins sheet 49)
MC DONALD COUNTY
BENTON COUNTY ARKANSAS
Eaglestone Mountain
Sugar Creek
Greasy Hollow
Seligman
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

SOIL SURVEY OF BARRY COUNTY, MISSOURI — SHEET NUMBER 49

N

R. 28 W. | R. 27 W.

650 000 FEET

(Joins sheet 44)

T. 21 N.

(Joins sheet 48)

(Joins sheet 50)

135 000 FEET

125 000 FEET

680 000 FEET

Seligman

Lennox Mountain

Reed Mountain

Landing Strip

Ford Mountain

Hollow

Creek

MARK TWAIN NATIONAL FOREST

BENTON COUNTY ARKANSAS

1 3/4 1/2 1/4 0 1 2 MILES

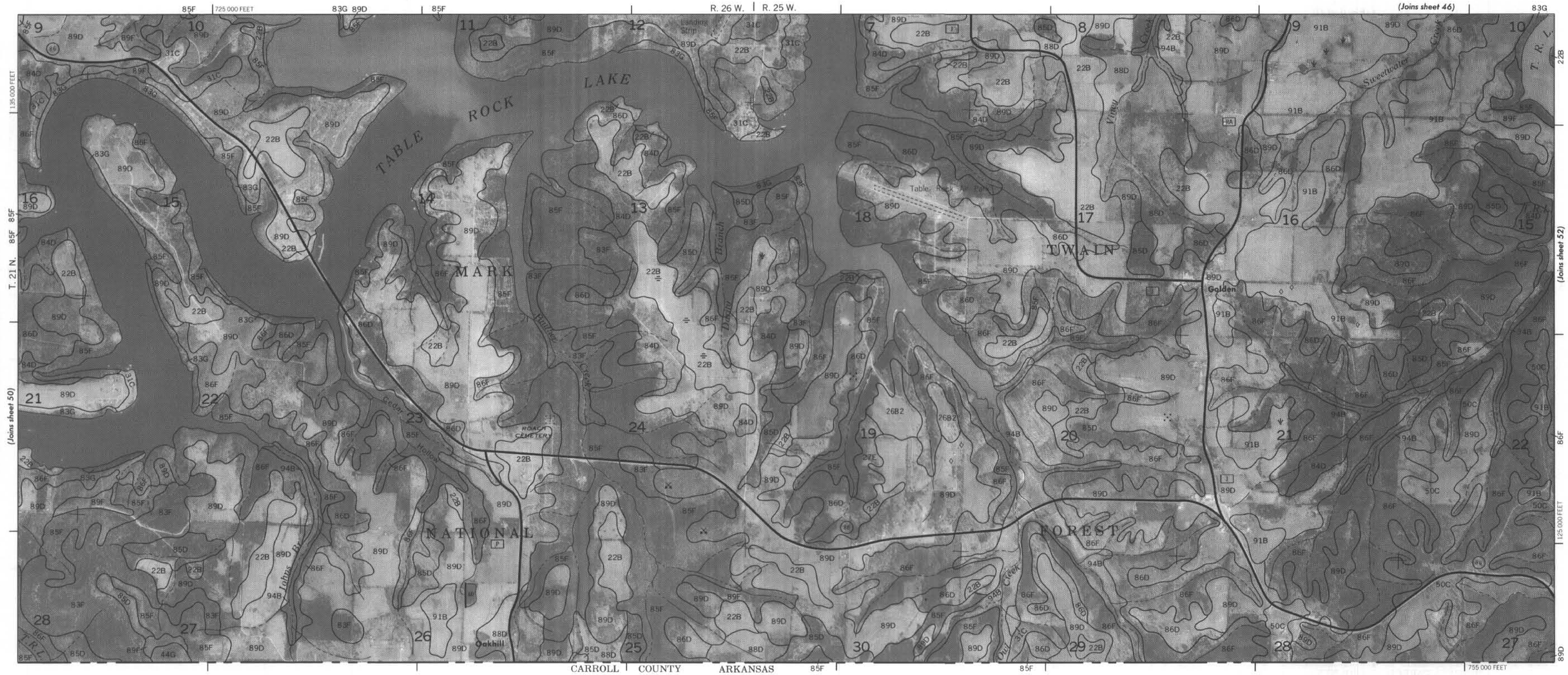
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

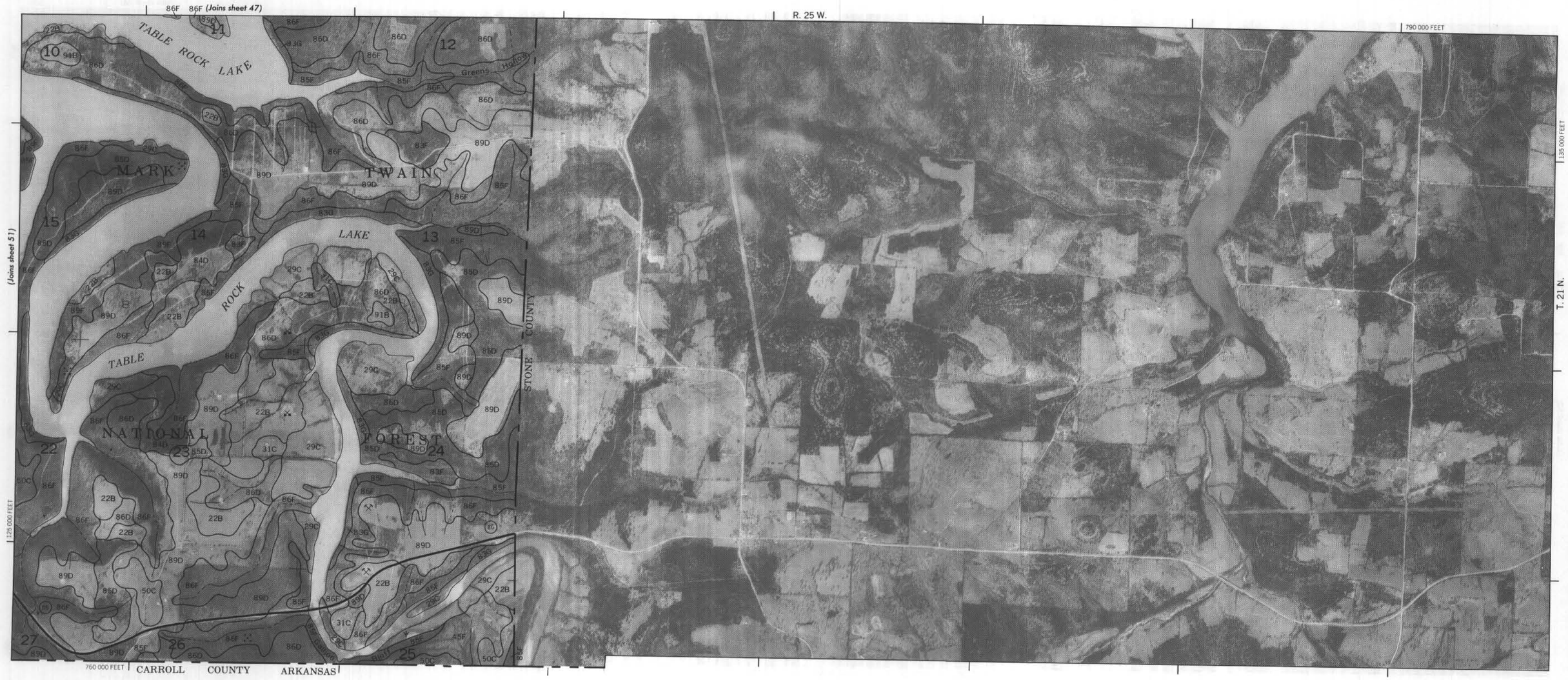
SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000